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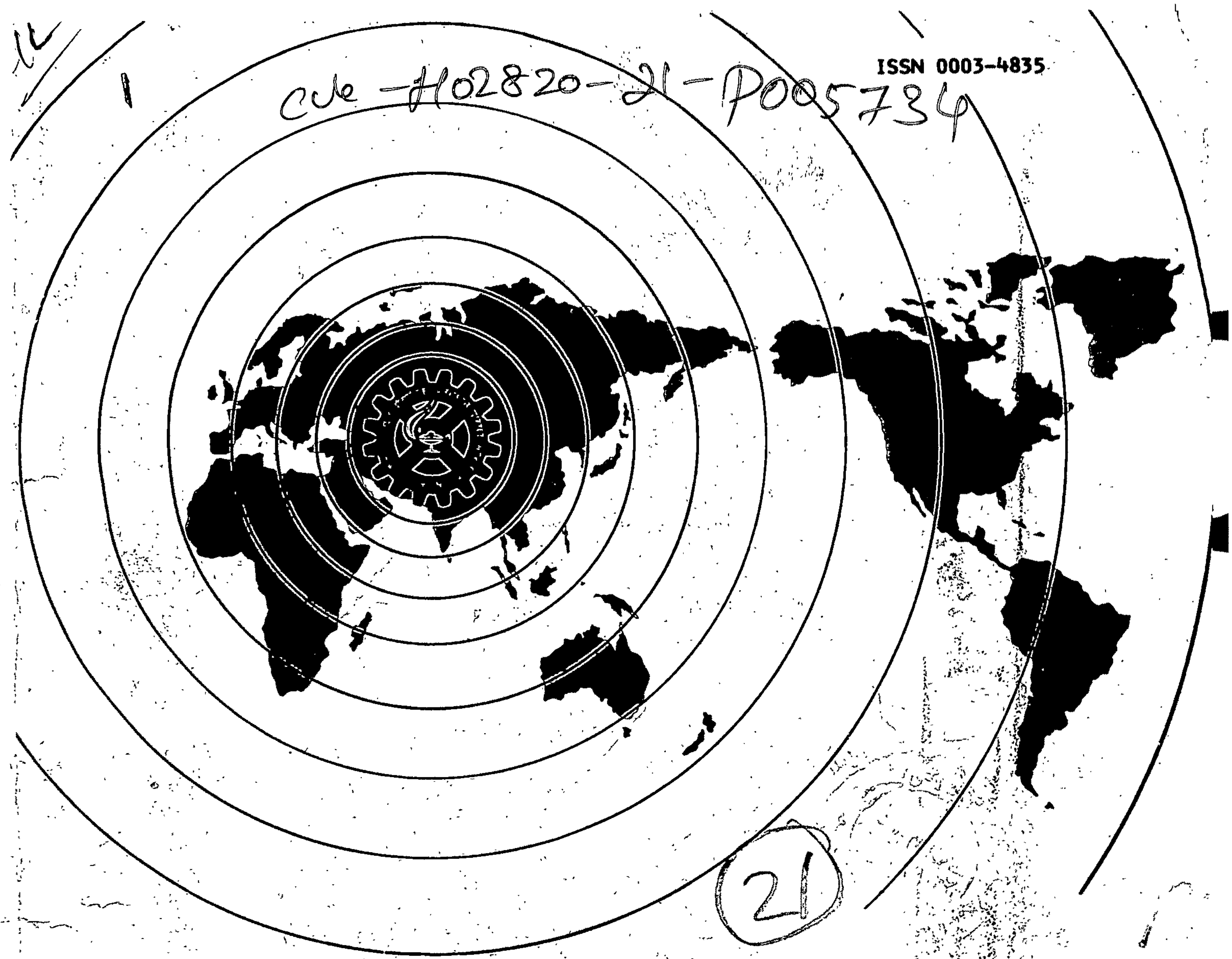

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APPLICATION OF INFORMATION TECHNOLOGY IN LIBRARIES

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INTRODUCTION

Librarians are increasingly turning to information technology to automate a number of functions in the libraries. A large number of libraries in the world have automated one or more of the following functions:

a) Acquisition,
b) Serials control,
c) Circulation,
d) Cataloguing,
e) Inter-library loan, etc.

For automating the above functions, information technology offers two approaches at the system level, i.e. integrated systems approach, and distributed systems approach.

INTEGRATED SYSTEMS APPROACH

In the integrated systems approach, a single system is used to implement automation in all he functions or activities. This has the advan- ge that all the data files reside on a single stem, which facilitates easy flow of rmation among various applications i.e. utomated functions of library. Data can be nised efficiently reducing redundancies e minimum. However, the systems has e drawbacks, i.e.

o keep all the applications on the same stem, a heavy investment on a large con- guration is required.

b) To give on-line support to a large number of users, it requires a large disk storage and a powerful CPU to ensure reasonable response time for the users,
c) The system requires a mainframe computer which involves high initial investment and
d) Failure of the system puts all applications out of gear.

DISTRIBUTED SYSTEM APPROACH

A distributed system approach permits incremental growth with low initial investment. One application at a time can be implemented and dedicated systems can be used for different applications. Different systems are interconnected to cooperate with each other. Multiple interconnected systems provide backup capability, i.e. if one system fails, another could be used to run the same application. Critical data may be stored in more than one systems, thus providing redundant copies of the data that may be used in the event of a catastrophic failure. Distributed systems also permit the use of computers purchased from different vendors and thereby provides greater flexibility to the user. In general, the distributed systems give an overall improved response and performance.

The distributed systems are also not free from drawbacks. When multi-vendor systems are used, inter-system operability of hardware and software is not guaranteed. Data storage formats in different systems may vary leading to difficulties in exchange of data among them. The maintenance of integrity, security and privacy are more difficult in the distributed system than in the centralised or an integrated system.

INFORMATION TECHNOLOGY AND COMPUTERS

For automating library functions, a variety of computer systems and latest techniques of information technology are used to a varying degree. They include:

-Personal computers
-Mini computers
-On-line systems
-Large centralised terminal oriented systems
-Local area networks
-Wide area networks
-Public switched telephone networks (PSTN)
-Satellite networks
-Fibre optic transmission systems
-Optical disk systems
-Facsimile systems
-Electronic imaging systems

Three approaches have emerged for the adoption of a software:

- Development of an in-house application program,

- Acquisition of a standard DBMS from commercial sources and addition of an application layer to suit the bibliographic applications.

- Acquisition of a tailor-made bibliographic DBMS from commercial sources.

CONFIGURATIONS FOR LIBRARIES OF DIFFERENT SIZES

The extent to which information technology is applied in a library depends largely on the size of the library. The number of holdings, the number of periodicals subscribed, the clientele and the availability/ non availability of on-line user services determine the computer configurations and the class and the number of computer systems to be used. In cases where on-line services are provided it is assumed that the bibliographic information about documents along with the keywords is maintained in the computer. The first step in planning a computer configuration for a library is to categorize the status of a library as follows:

If H, P, C, S, represent the maximum number of holdings, maximum number of periodicals subscribed , maximum number of registered users, on-line user service support, and S1 & S2 represent absence or presence of on-line user services, respectively, a library may be categorized by means of a tuple comprising four elements H,P,C,S as follows:

Very small library (< 50,000, 100, 2000, S1);

Small library (1,50,000, 300, 3000, S1);

Medium Library(3,00,000, 500, 5000, S2

Large library (5,00,000, 1000, 7000, S

Very large library (>5,00,000, >1000, >7
S2);

While selecting the computer configur
for various categories of libraries
important parameters needed to be consi
are as follows:

a) Storage capacity;
b) Processor speed;
c) Software; and
d) Networking capability.

Very Small Library

For a very small library, two PC/XT systems with the following specifications would suffice.

- 8088 based CPU @ 8 or 10 MHz speed,
- 640 KB main memory,
- 40 MB Winchester disk,
- 1 serial port and 1 parallel port,
- B/W monitor,
- MSDOS operating system,
- CDS/ISIS or DBASE III plus software,
- PC-to-PC communication software and
- 132 Col. NLQ Printer.

Although one PC/XT will serve the purpose, it is desirable to have another PC/XT as a standby system. To get the best results, all the updates must be carried out on both the systems. In order to avoid the duplicate effort of inputting the information and the occurrence of possible inconsistency in data due to typographical errors, a simple PC-to_PC communication link may be established using RS 232 C links.

To transfer files between the system, many low cost software packages, such as KERMIT, MSNET, PROCOMM and CROSSTALK, are available . CDS/ISIS is a good choice to automate the library functions although DBASE III with some programming may well serve the same purpose. DBASE III plus also supports network functions and would enable file transfer between the two systems.

Small Library

For a small library, a system configuration with two computers similar to that of a very small library is suitable. However, a more powerful PC is required and a PC/AT with the following specifications will serve the purpose.

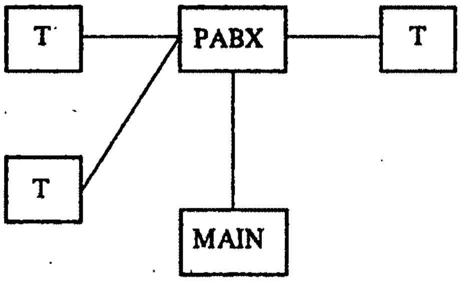
- 80286 CPU @ 10 or 12 MHZ speed,
- 1 MB main memory,
- 80 MB Winchester disk,
- 1 serial and 1 parallel port,
- B/W monitor,
- 132 Col. NLQ printer,
- MSDOS operating system,
- CDS/ISIS or DBASE III plus software and
- PC to PC communication software

Medium Size Library

For medium size libraries with on-line access facilities, a larger computer system and a local area networking environment are required. Users may access the database from a number of terminals/PCs. Simultaneous operations of catalogue updating, inputting, issue/return, record and bibliographic search can take place. The larger computer system having a powerful CPU may hold the complete database and provide a good response time. A suitable configuration may be as follows:

- 80386 based CPU,
- 4 MB main memory,
- 160 MB Winchester disk,
- Serial and parallel ports,
- B/W monitor,
- 132 Col. NLQ printer,
- Unix operating systems and
- A bibliographic DBMS or a relational DBMS with a user written shell.
- A Local Area Network (LAN) can be configured in the library in one of the following three ways:

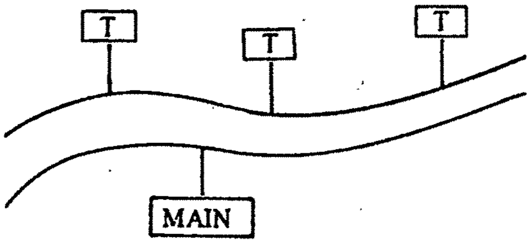
1. Star configuration of LAN,



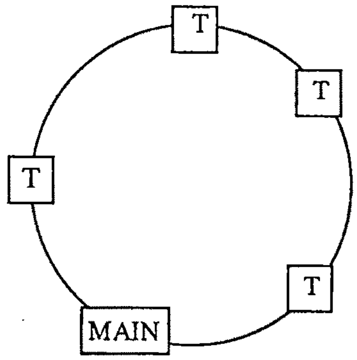
T = Terminal system

MAIN = Main system holding the database

2. Bus configuration of LAN



3. Ring configuration of LAN.



In a star LAN, the serial ports of the main computer system are connected to telephone lines through modems. Similarly, other access systems like PCs are also connected to the telephone lines via modems. The PC can dial up the number corresponding to the port of the main system and establish communication link using the PABX lines. This configuration is economical and does not call for special networking interfaces and software. However, once a port of the main system is engaged for a user, it is not available for other users. On the other hand, the bus and the ring configurations permit a large number of systems to access the main system quasi-simultaneously. These configurations require specialised interfaces and software packages. These are generally suited for heavy traffic situation and are recommended for large and very large libraries.

INTER LIBRARY NETWORK

For catalogue access and document interchange among various libraries, inter library network is used with wide area communication facilities. These may be:

- Public Switched Telephone Network (PSTN),
- Public Data Networks (PDN),
- Satellite Data Networks (SDN),
- Network of Leased Lines and
- Integrated Services Digital Network (ISDN).

PSTN works on the basis of circuit switching. In this case, the computers in two different libraries are connected to each other by a wire path which is dedicated to these systems for the entire duration of communication. In this type of switching systems, a call is set up, data is transferred and the call is released. It may be noted that once a call is set up, the line is held even though there is no data transfer using the line. PSTN, however, is the most easily available form of communication that could be used for data transfer purposes.

Presently, many countries have set up dedicated public data networks (PDN) for data transfer. These networks work on a packet switched mode wherein a physical line can be used more efficiently by multiplexing message packets from a number of sources. In packet switched networks, the packets are moved from one station to another in hops and thus the network functions in a store and forward fashion.

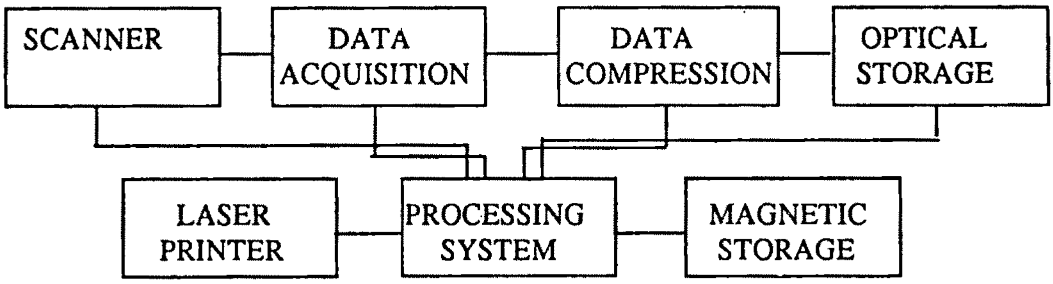
Satellite networks are, in general, broadcast networks where a message transmitted by one station is heard by all other stations. However, frequency division multiplexing and time division multiplexing techniques can be used for providing point to point links in satellite networks. The main reason for this is that a number of switching stations are involved in terrestrial connections whereas in the case of satellite networks the only switching station is the satellite itself. Satellite data networks may be single hop or two hop networks. In a single hop network, the ground stations use larger antenna and powerful transmitters and hence are more expensive. In a two hop network, there is a large central earth station and a small inexpensive user terminal. There can be no direct user to user communication in this case and all communications have to be routed via the main earth stations.

ISDN is relatively a new concept where a single network may be used for a number of services like voice, data, facsimile and so on. Such networks when realised will offer fairly inexpensive mode of data transmission and document interchange.

FULL TEXT STORAGE SYSTEM

Another important area of information technology that is likely to find extensive use in libraries is the electronic imaging system.

These systems permit the storage of complete documents including diagrams and graphs in electronic media. With the use of optical storage devices, these systems are ideally suited for archival purposes. A block diagram depicting various components of an electronic imaging system is shown below:



FIBRE-OPTICS

Optical fibres are emerging as an alternative transmission media to co-axial cables in telecommunication networks. There are three types of optical fibres:

- Step index single mode
- Graded index multi-mode
- Step index multi-mode

Of these, the first one is the most expensive but has a high bandwdth capacity. The commonly used fibres are graded index multimode type. Optical fibres have several advantages over the electrical cables but are not without problems. The merits of the optical fibres stem from the fact that the basic material used in their construction is non-metallic and electrically non-conductive. The problems are due to their delicate structure.

CONCLUSION

The world is passing through an age of unprecedented information explosion. As the time passes, the librarians and information scientists will be called upon to handle, process and supply larger and larger volumes of information. Recourse to automation and employment of information technology is, thus, inevitable. However, the computer and communication technology, itself, is passing through a period of extreme evolution and development. In the times ahead, therefore, libraries and information centres will have to employ more and more of modern information technology to cope with the rapidly multiplying literature and its demand all over the world.

Annals of Library Science and Documentation 1991, 38(1), 8-29

SCIENTOMETRIC DIMENSIONS OF INNOVATION COMMUNICATION PRODUCTIVITY SYSTEM

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*Coimbatore**

Communication activities of Sugarcane Breeding Institute (SBI) during the past 75 years (1912-1987) are quantitatively documented for general characteristics, collaborations, core channels of communications and creativity of researchers. A communicator's productivity and the distribution of papers to a number of domains are classified and Pearson Product Moment Correlation Coefficients are calculated. Genderwise creativity, participation in joint authorships, communications, theses, etc. from SBI are classified year-wise, domain-wise and university-wise. Breeding, genetics & cytogenetics, entomology, pathology and physiology & biochemistry domains show high communication productivity. The study may be of interest to all those interested in evaluating research communication performance of departments in universities, institutions, industries and R & D laboratories.

INTRODUCTION

The organisation of science and its productivity analysis results in scientometrics. Scientometrics has emerged as a new discipline which uses bibliometric methods for evaluation and measurement of scientific progress and its social relevance.

Scientometrics of the publications in a field of specialisation for a specific period in a specific region reliably reflects its development trend. Publications are also a reliable source of information to measure the productivity trend of authors and provide reliable data for quantitative analysis.

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Review of the periodical literature reporting researches in any field is useful in gaining an insight into the general direction of research and to ascertain the future needs in the context of changing perspectives of a particular discipline.

The communications emanating from Sugarcane Breeding Institute (SBI), Coimbatore, are studied to ascertain the communication productivity pattern in sugarcane research. The discipline of sugarcane improvement involves six domains, namely - botany (A), genetic resources (B), breeding (C), genetics & cytogenetics (D), mutation (E) and tissue culture (F). The discipline of sugarcane production involves three domains, namely - physiology & biochemistry (G), agricultural chemistry (H) and agronomy & soil science (I). The discipline of sugarcane protection involves three domains, namely - pathology (J), entomology (K) and nematology (L). The staff of the domain of statistics (M) assists all scientists and technicians of Sugarcane Breeding Institute in data processing, thus enabling the generation of information through analyses of the recorded data. The staff of the domains of extension (N) and library (O) gathers relevant information generated by researchers and supplies it to the clients, namely - farmers and industries, and further collects the information on problems faced by the clients and gives feed-back to the concerned scientists. So, M, N and O domains are mainly service oriented, whereas other domains are purely research oriented.

The study pertains to information on an individual cash crop, i.e. sugarcane which is top ranking among all crops for calories production per unit area [1] and has vital significance in the context of all round regional socio-economic development.

Researchers at Sugarcane Breeding Institute generate information through experimental investigations and disseminate it through communications to their fellow sugarcane researchers elsewhere, managers of sugar industries, administrators in the Government, teachers and students in the universities, farmers and the society in general.

OBJECTIVES AND SCOPE

The objectives of the present study are:

a) To understand characteristics of communications,

b) To identify core communication dissemination channels,

c) To ascertain the prolific innovation communication stars,

d) To calculate Pearson Product Moment Correlation, and

e) To note gender-wise participation in research.

The present study encompasses only one crop - sugarcane and publications from only one institute, i.e. SBI, and confines itself to the quantitative assessment only. A microtheme of the kind dealt herein may not throw much light on all aspects of the multidimensional innovation communication system at macrolevel. The contribution to science differs from paper to paper. The differences between disciplines and institutions occur with regard to the communication behaviour. Thus,the study will serve to project the partial indicators of research performance. However, these limitations will not stand in the way of highlighting past activities and current state-of-art of research to researchers, administrators, extension personnel, planners and policy makers.

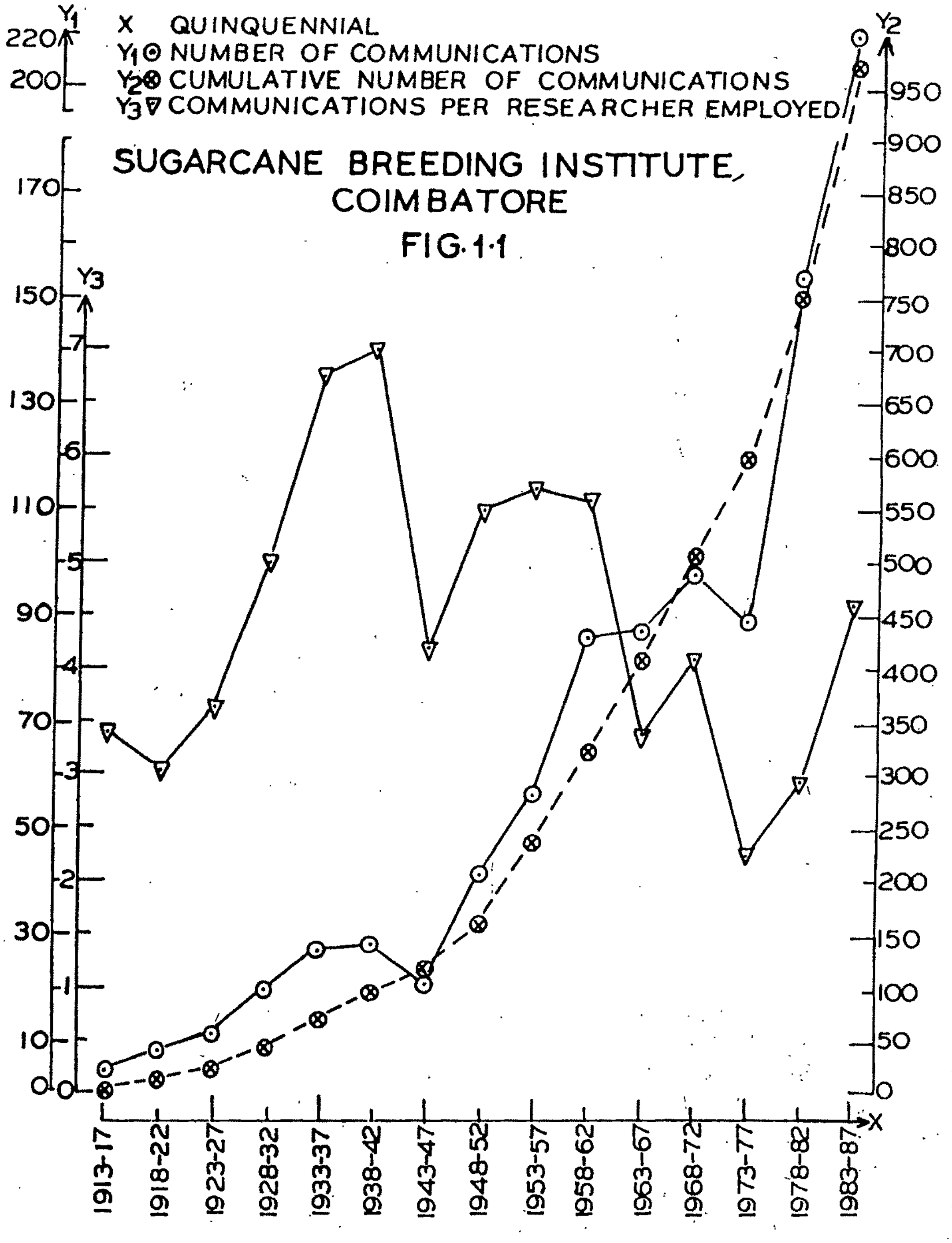
METHODOLOGY

The necessary content particulars of publications were recorded on reference cards. These reference cards were arranged keeping in view the requirements of the study, each author was given full authorship credit i.e. one score for every occurrence of the name in authorship.

The degree of collaboration in a domain is defined as the ratio of the number of collaborative papers to the total number of papers published in a domain during a certain period of time and is called `g' ``Group Collaboration Coefficient'' [2].

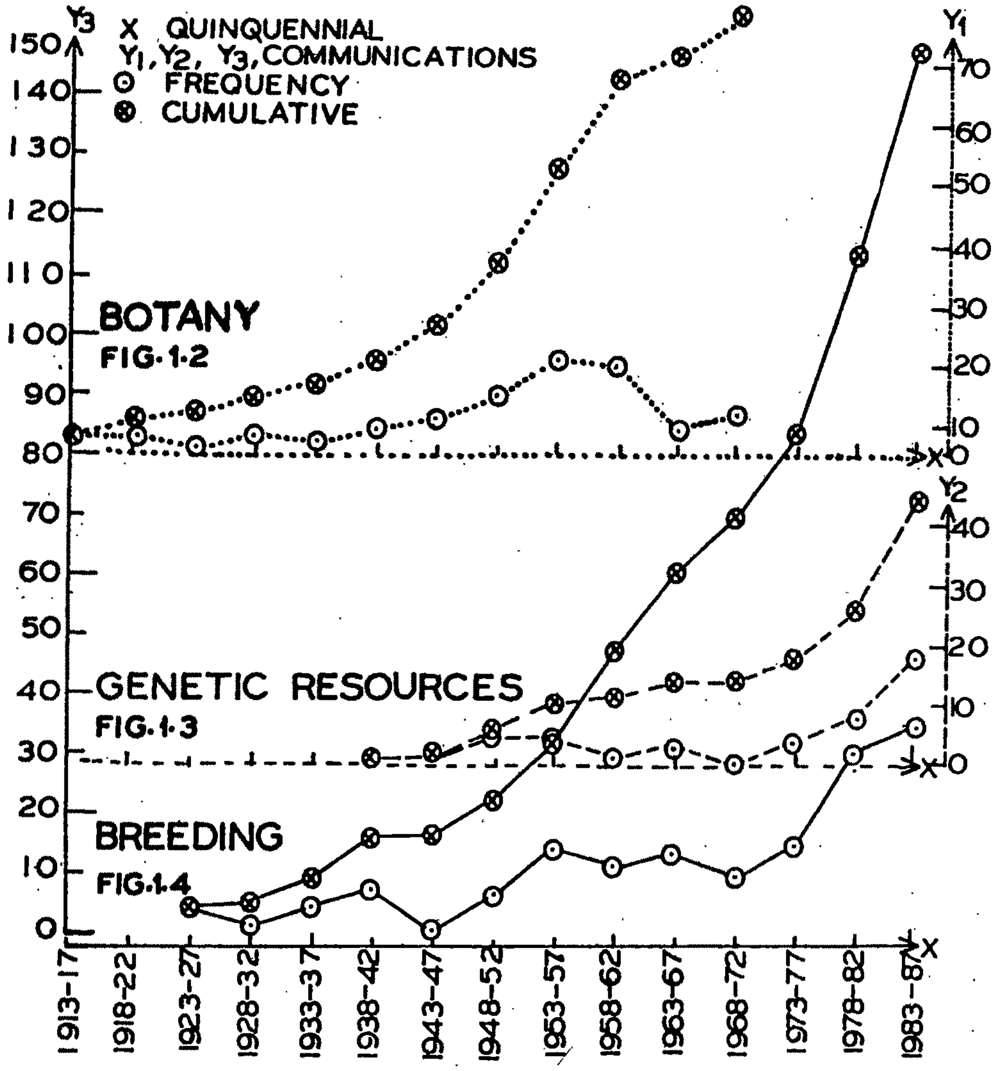
Creativity [3] was recognised as ``convergent'' for those who contribute to a single discipline and ``divergent'' for those who contribute to more than one discipline. The authors who restrict themselves to only one domain were called ``domainers'', those who contribute to two domains in the same discipline were called ``interdomainers'', those who contribute to more than two domains but restrict to only one discipline were called ``discipliners'' whereas those who interact with and contribute to other disciplines were ``interdiscipliners'', while ``spanners'' were those who interact with more than two disciplines. Spanners possessed higher divergent creativity.

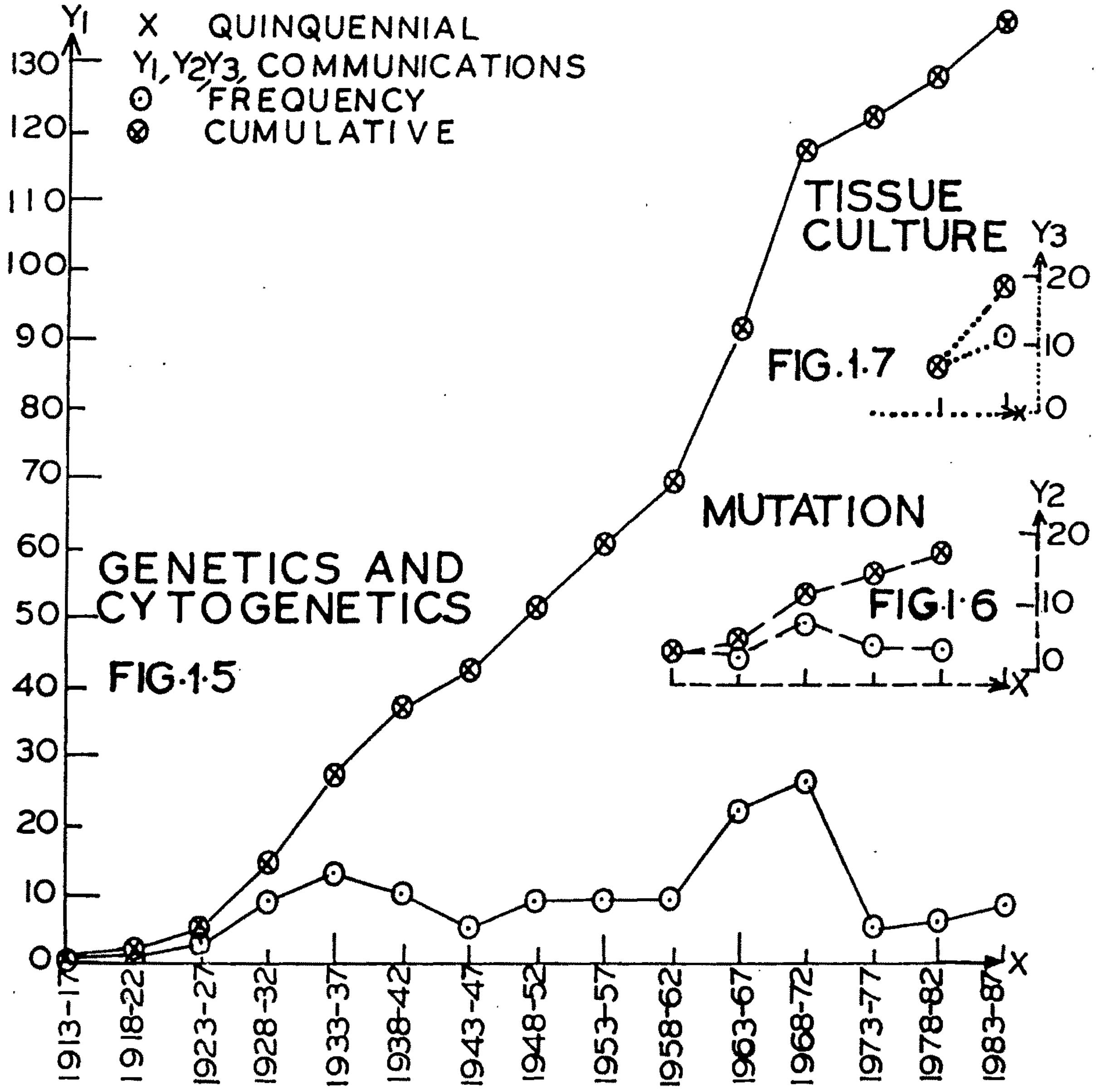
``Divergent Thinking Creativity Ratio'' (DTCR) is defined as the ratio of the number of domains to which an individual contributed to the total number of domains to which the institute contributed. Contributions to

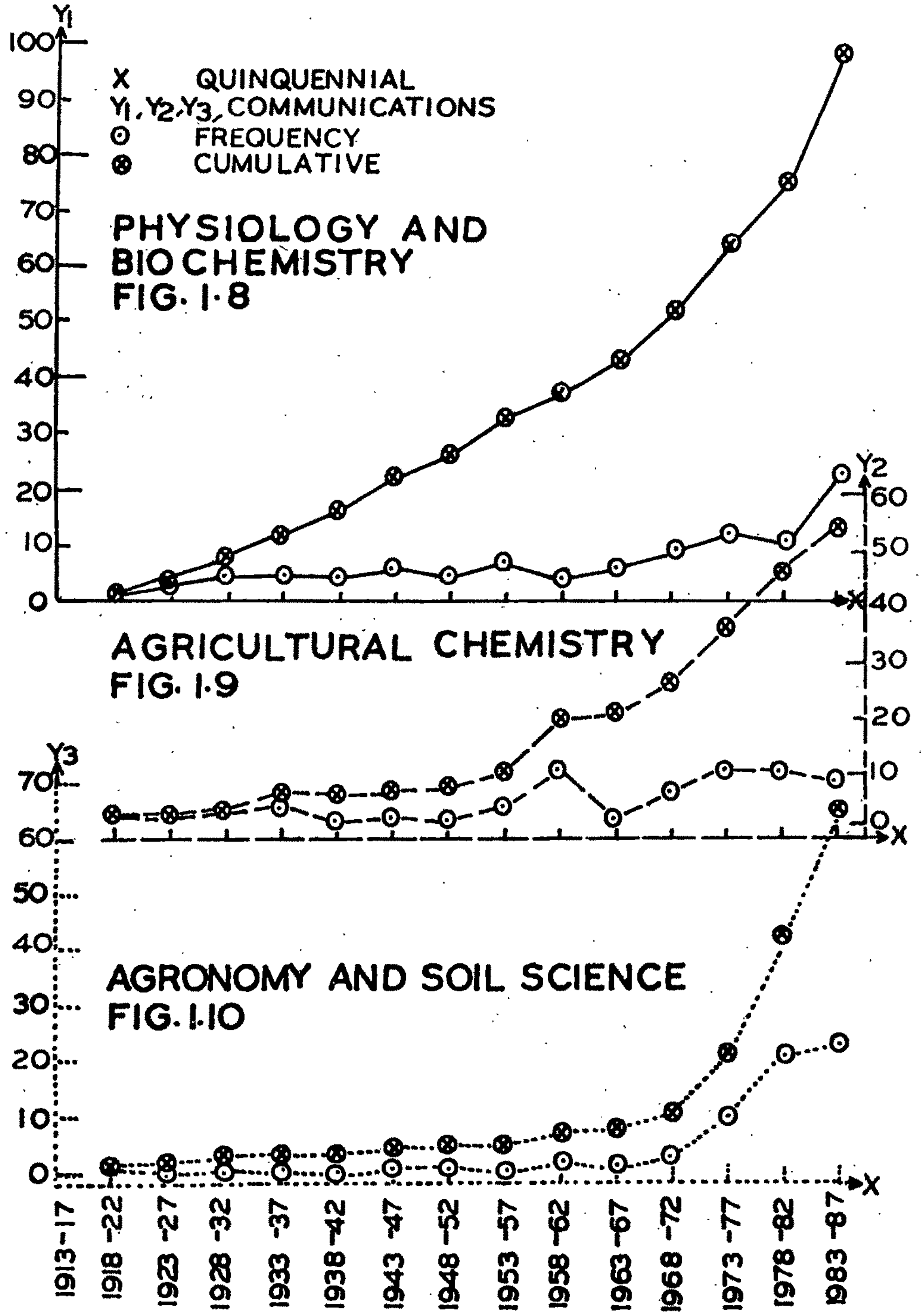


SUGARCANE BREEDING INSTITUTE, COIMBATORE

FIG.1.1


Y3
X QUINQUENNIAL
Y1, Y2, Y3, COMMUNICATIONS
⊙ FREQUENCY
⊗ CUMULATIVE
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
BOTANY
FIG-1-2
GENETIC RESOURCES
FIG-1-3
BREEDING
FIG-1-4
Y1
70
60
50
40
30
20
10
0
Y2
40
30
20
10
0
X
1913-17
1918-22
1923-27
1928-32
1933-37
1938-42
1943-47
1948-52
1953-57
1958-62
1963-67
1968-72
1973-77
1978-82
1983-87

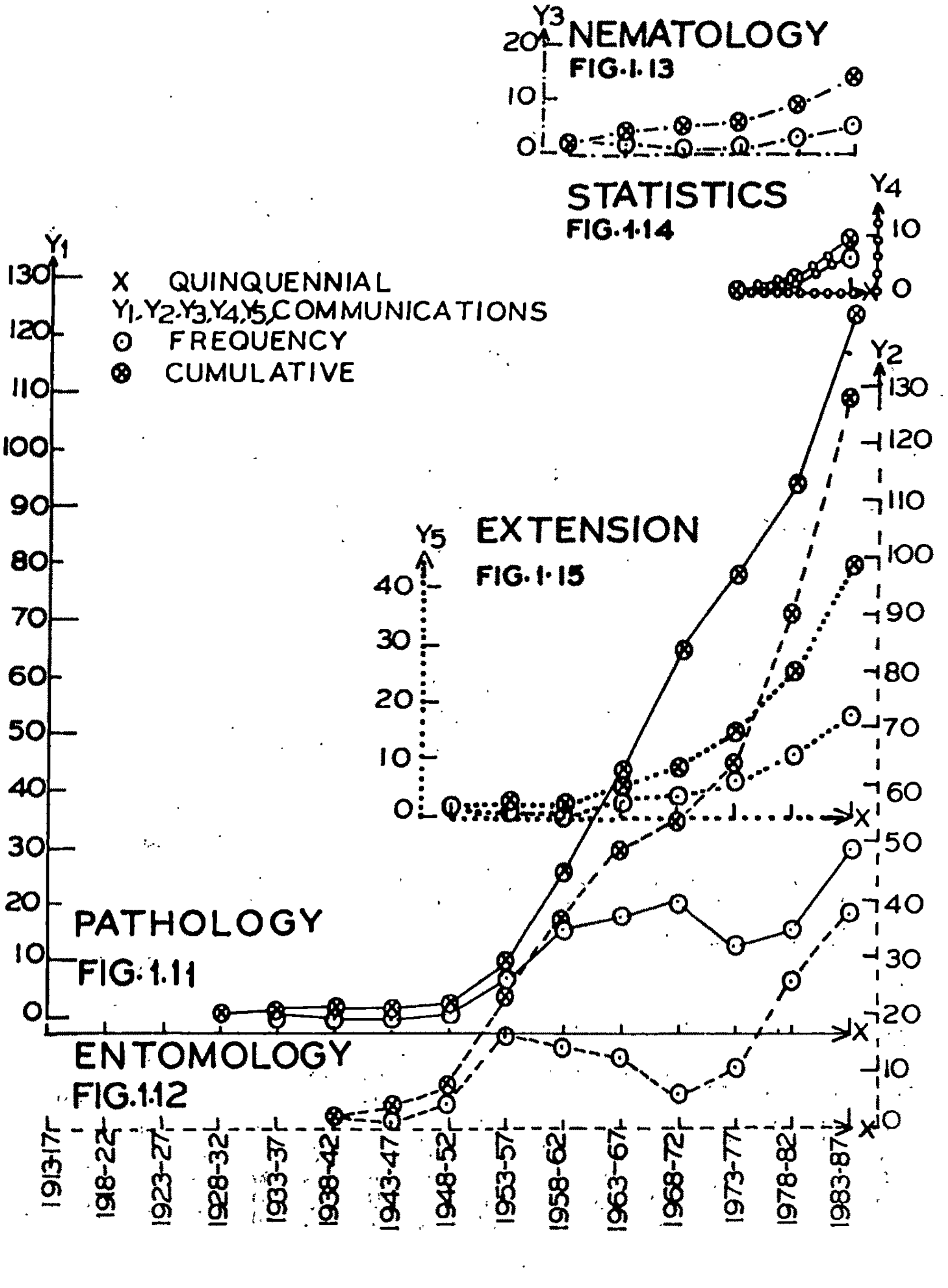

Y1
X QUINQUENNIAL
Y1, Y2, Y3, COMMUNICATIONS
⊙ FREQUENCY
⊗ CUMULATIVE
130
120
110
100
90
80
70
60
50
40
30
20
10
0
GENETICS AND CYTOGENETICS
FIG.1.5
TISSUE CULTURE
FIG.1.7
Y3
20
10
0
MUTATION
FIG.1.6
Y2
20
10
0
X
1913-17
1918-22
1923-27
1928-32
1933-37
1938-42
1943-47
1948-52
1953-57
1958-62
1963-67
1968-72
1973-77
1978-82
1983-87
X



PHYSIOLOGY AND BIOCHEMISTRY FIG. 1·8

AGRICULTURAL CHEMISTRY FIG. 1·9

AGRONOMY AND SOIL SCIENCE FIG. 1.10


NEMATOLOGY
FIG.1.13
Y3
20
10
0
STATISTICS
FIG.1.14
Y4
10
0
X QUINQUENNIAL
Y1,Y2,Y3,Y4,Y5,COMMUNICATIONS
⊙ FREQUENCY
⊗ CUMULATIVE
Y1
130
120
110
100
90
80
70
60
50
40
30
20
10
0
EXTENSION
FIG.1.15
Y5
40
30
20
10
0
Y2
130
120
110
100
90
80
70
60
50
40
30
20
10
0
PATHOLOGY
FIG.1.11
ENTOMOLOGY
FIG.1.12
X
1913-17
1918-22
1923-27
1928-32
1933-37
1938-42
1943-47
1948-52
1953-57
1958-62
1963-67
1968-72
1973-77
1978-82
1983-87

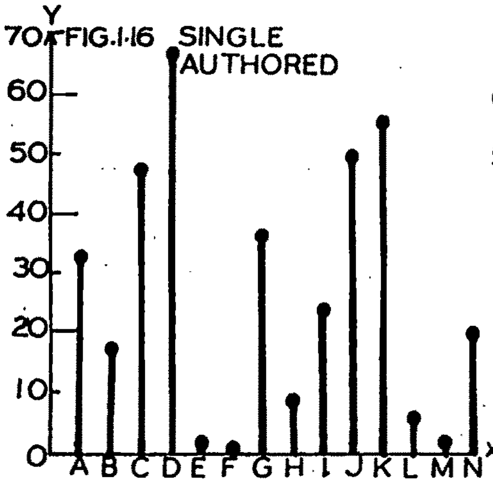


FIG. 1.16 SINGLE AUTHORED

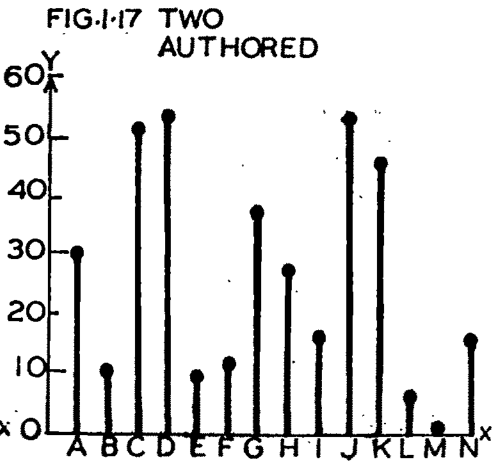


FIG. 1.17 TWO AUTHORED

X DOMAINS
Y No. OF COMMUNICATIONS

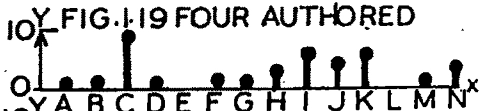


FIG. 1.19 FOUR AUTHORED

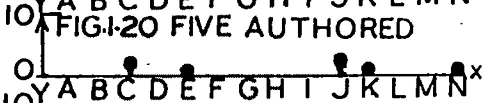


FIG. 1.20 FIVE AUTHORED

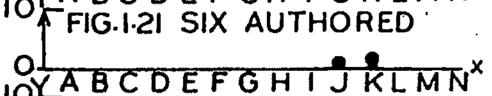


FIG. 1.21 SIX AUTHORED

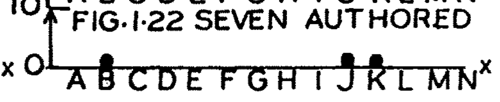


FIG. 1.22 SEVEN AUTHORED

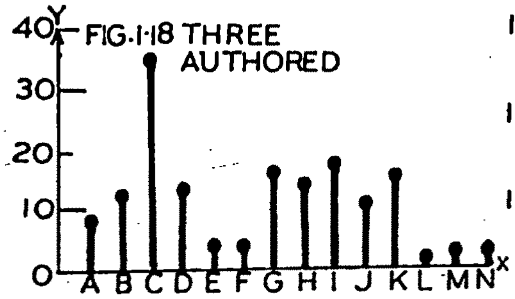


FIG. 1.18 THREE AUTHORED

CALCUTTA CENTRAL LIBRARY

Table 1

Absolute characteristics of the communication activities at Sugarcane Breeding Institute, Coimbatore, India : 1912-1987

Characteristics Domain	n	c	nm	cm	ns	cs	ma	ta	w
Botany	33 (7.93)	74 (7.63)	29 (7.46)	41 (6.87)	12 (10.71)	33 (8.85)	93 (6.26)	126 (6.78)	134 (6.44)
Genetics Resources	30 (7.21)	44 (4.54)	23 (5.91)	26 (4.36)	10 (8.93)	18 (4.83)	72 (4.85)	90 (4.84)	98 (4.71)
Breeding	54 (12.98)	147 (15.15)	51 (13.11)	99 (16.58)	14 (12.50)	48 (12.87)	258 (17.37)	306 (16.47)	357 (17.15)
Genetices & Cytogenetics	49 (11.78)	136 (14.02)	47 (12.08)	69 (11.56)	18 (16.07)	67 (17.96)	154 (10.37)	221 (11.89)	223 (10.71)
Mutation	21 (5.05)	17 (1.75)	21 (5.40)	15 (2.51)	2 (1.79)	2 (0.54)	37 (2.49)	39 (2.10)	52 (2.50)
Tissue Culture	5 (1.20)	18 (1.86)	5 (1.29)	17 (2.85)	1 (0.89)	1 (0.27)	40 (2.69)	41 (2.21)	57 (2.74)
Physiology & Biochemistry	36 (8.65)	98 (10.10)	35 (9.00)	61 (10.22)	13 (11.61)	37 (9.92)	141 (9.49)	178 (9.58)	202 (9.70)
Agricultural Chemistry	20 (4.81)	54 (5.57)	19 (4.88)	45 (7.54)	3 (2.68)	9 (2.41)	110 (7.41)	119 (6.40)	155 (7.49)

Contd.

Characteristics Domain	n	c	nm	cm	ns	cs	ma	ta	w
Agronomy & Soil Science	40	65	37	41	9	24	112	136	153
	(9.62)	(6.70)	(9.51)	(6.87)	(8.04)	(6.43)	(7.54)	(7.32)	(7.35)
Pathology	47	124	47	74	8	50	185	235	259
	(11.30)	(12.78)	(12.08)	(12.40)	(7.14)	(13.40)	(12.86)	(12.65)	(12.44)
Entomology	38	128	35	72	12	56	188	244	260
	(9.13)	(13.20)	(9.00)	(12.06)	(10.71)	(15.01)	(12.66)	(13.13)	(12.49)
Nematology	11	14	10	8	2	6	18	24	26
	(2.64)	(1.44)	(2.57)	(1.34)	(1.79)	(1.61)	(1.21)	(1.29) ------	(1.25)
Statistics	9	7	9	5	1	2	15	17 --	20
	(2.16)	(0.72)	(2.31)	(0.84)	(0.89)	(0.54)	(1.01)	(0.91) -----	(0.96)
Extension	23	44	21	24	7	20	62	82 --	86
	(5.53)	(4.54)	(5.40)	(4.00)	(6.25)	(5.36)	(4.18)	(4.41)	(4.12)
Sugarcane Breeding Institute, CBE.	177	970	133	597	44	373	1485	1858	2082

Percentage share in publication output in parentheses

n = Actual number of contributors or researchers or communicators or authors in the domain
c = Number of absolute communications per domain
nm = Number of contributors for multiauthored communications in the domain
cm = Number of multiauthored communications per domain
ns = Number of contributors for single authored communications in the domain
cs = Number of single authored communications
ma = Multiauthorships total
ta = Total authorships total
w = Weight for communication which is simply one over the number of collaborators.

one discipline were taken as ``Convergent Thinking Creativity'' (CTC).

The authors were treated as a `source' of publications and the following seven files were created:

i) authors with 1 to 4 papers (very low productivity),
ii) authors with 5 to 10 papers (low productivity),
iii) authors with 11 to 20 papers (medium productivity),
iv) authors with 21 to 30 papers (high productivity),
v) authors with more than 31 papers (very high productivity),
vi) authors with more than 2 papers (multiple-paper authors' productivity) and
vii) total group of authors' productivity.

To test the relationship of productivity of authors and their contributions to a number of research areas, Pearson Product Moment Correlation Coefficient (r) was computed [4] for the data in each file.

Motivation behind gender-wise analyses of credits was to focus particularly on the participation of women in agricultural research, wishing the outcome would sensitize, encourage and create consciousness among young women to confidently undertake active participation in the mainstream of agricultural research without any hesitation, enabling themselves to share responsibilities with men equally in the 21st century.

RESULTS AND DISCUSSION

Sugarcane Breeding Station was started in 1912 at a time when sugarcane production had suffered widespread failure due to diseases and pests in tropical thick cultivars. Yields were very low in sub-tropical thin cultivars and the first Sugarcane Commission had recommended closing of all sugar factories and stopping of cultivation of sugarcane as it was not economical. If it was accepted, probably India would have suffered from sugar shortage and sugarcane cultivators would have missed the varieties of sugarcane released from SBI which became very popular all over notwithstanding the geographical and political barriers.

Communication Characteristics

Research output in terms of the number of communications provides an important measure of performance of a research institution [6]. Domain-wise, quinquennial vs. frequency and cumulative number of communications in SBI are depicted in Figs 1.1 to 1.15.

In order to determine authorship pattern in communications, data were compiled as per authorships and plotted in Figs 1.16 to 1.22 which indicated that the majority of the collaboration activities were limited upto three authorships. Very few domains had five to seven collaboratorships. Researchers do cooperate, but their cooperation is narrowed down due to personal interests of deeper specialization. Researchers do not work alone but they prefer to share more with their likes than with those who differ greatly in the training acquired as well as in profession. Swaminathan [5] pointed out - `Another requisite of a successful research system is the development of a pattern of inter-disciplinary coordination within the scientific team. so that it performs like a symphony orchestra'.

The general characteristics of the communication activities [7] are discussed below.

Absolute Characteristics: Table 1 indicates absolute characteristics of the communications productivity. During seventy five years, the 177 researchers have contributed 970 papers. More than forty communicators

Table 2

Ratio characteristics of the communication activities at SBI, 1912-1987

Characteristics	c/n	cm/nm	cs/ns	ma/nm	ta/n	ta/c	w/n	w/c	w/nm	g
Domain										
Botany	2.24	1.41	2.75	3.21	3.82	1.70	4.06	1.31	4.62	0.554
Genetic Resources	1.47	1.13	1.80	3.13	3.00	2.05	3.27	2.23	4.26	0.590
Breeding	2.72	1.94	3.43	5.06	5.66	2.08	6.61	2.43	7.00	0.673
Genetics & Cytogenetics	2.78	1.47	3.72	3.28	4.51	1.63	4.55	1.64	4.74	0.507
Mutation	0.81	0.71	1.00	1.76	1.86	2.29	2.48	3.06	2.48	0.882
Tissue Culture	3.60	3.40	1.00	8.00	8.20	2.28	11.40	3.17	11.40	0.944
Physiology & Biochemistry	2.72	1.74	2.85	4.03	4.94	1.82	5.61	2.06	5.77	0.622
Agricultural Chemistry	2.70	2.37	3.00	5.79	5.95	2.20	7.75	2.87	8.16	0.833
Agronomy & Soil Science	1.63	1.11	2.67	3.03	3.40	2.09	3.83	2.35	4.14	0.630
Pathology	2.64	1.57	6.25	3.94	5.00	1.90	5.51	2.09	5.51	0.596
Entomology	3.37	2.06	4.67	5.37	6.42	1.91	6.84	2.03	7.43	0.562
Nematology	1.27	0.80	3.00	1.80	2.18	1.71	2.36	1.86	2.60	0.571
Statistics	0.78	0.56	2.00	1.67	1.89	2.43	2.22	2.86	2.20	0.714
Extension	1.91	1.14	2.86	2.95	3.57	1.86	3.74	1.95	4.09	0.545
Sugarcane Breeding Institute, CBE.	5.48	4.49	8.48	11.17	10.49	1.92	11.76	2.15	15.65	0.615

c/n =number of communications per author, cm/nm = Number of multiauthored communications per author contributing towards multiauthored communications, cs/ns = Number of single authored communications per author contributing towards single authored communications, ma/nm = Multiauthorship per author contributing towards multiauthored communications, ta/n = Average authorship per author, ta/c = Average authorship per communications, w/n = Weighted communications per author, w/c = Weighted communications per absolute communication, w/nm = Weighted communications per number of contributors for multiauthored communications, g = group collaboration coefficient.

contributed to breeding, genetics & cytogenetics, agronomy & soil science and pathology. More than hundred communications were from breeding, genetics and cytogenetics, pathology and entomology.

More than forty researchers contributing to multiauthored communications were from breeding, genetics & cytogenetics and pathology while there were fifty multiauthored communications from breeding, genetics & cytogenetics, physiology & biochemistry, pathology and entomology.

More than twelve communicators with sole authorships were in botany, breeeding, genetics & cytogenetics, physiology & biochemistry and entomology domains whereas single authorship communications in the domains of botany, breeding, genetics & cytogenetics, physiology & biochemistry, pathology and entomology were above thirty.

More than one hundred multiauthored communications were in breeding, genetics, & cytogenetics, physiology & biochemistry, agricultural chemistry, agronomy & soil science, pathology and entomology. The number of total authorships in botany, breeding, genetics & cytogenetics, physiology & biochemistry, agricultural chemistry, agronomy & soil science, pathology and entomology were also above hundred.

Weighted communications in the domains of breeding, genetics & cytogenetics, physiology & biochemistry, pathology and entomology were more than two hundred.

Overall indications are that breeding, genetics & cytogenetics, entomology and pathology had higher innovation communications productivity since all of these domains had an early beginning in research activities. Tissue culture, mutation, nematology and statistics had a low productivity during the period because research activities in these domains were initiated only recently.

Ratio Characteristics: Table 2 provides information on ratio characteristics of innovation communication productivity. More communications per communicator were in breeding, genetics & cytogenetics, tissue culture, physiology & biochemistry, agricultural chemistry, pathology and entomology. A high number of multiauthored communications per author were recorded in breeding, physiology and biochemistry, tissue culture, agricultural chemistry and entomology.

The number of single-authored communications per author in breeding, genetics and cytogenetics, agricultural chemistry, pathology, entomology and nematology was also high.

High multiauthorships per author contributing to multiauthored communications were found in breeding, tissue culture, physiology & biochemistry, agricultural chemistry and entomology.

High total authorships per author were recorded in breeding, genetics & cytogenetics, tissue culture, physiology & biochemistry, agricultural chemistry, pathology and entomology.

High total authorships per communication were found in genetic resources, breeding, mutation, tissue culture, agricultural chemistry, agronomy & soil science and statistics.

High weighted communications per communicator were found in breeding, tissue culture, physiology & biochemistry, agricultural chemistry, pathology and entomology.

High weighted communicators per communication were found in mutation and tissue culture domains.

Table 3

Authorship Pattern in the Communications from Sugarcane Breeding Institute, Coimbatore during 1912-1987.

Authorship	Improvement	Production	Protection	Statistics	Extension	S.B.I
I	169	70	112	2	20	373
	(45.31%)	(18.76%)	(30.03%)	(0.54)	(5.36%)	(1oo%)
II	170	88	106	1	16	381
	(44.62%)	(23.10%)	(27.82%)	(o.26%)	(4.20%)	(100%)
III	80	49	29	3	3	164
	(48.78%)	(29.88%)	(17.68%)	(1.83%)	(1.83%)	(100%)
IV	13	10	10	1	4	38
	(34.21%)	(26.32%)	(26.32%)	(2.63%)	(10.52%)	(100%)
V	3	-	4	-	1	8
	(37.50%)	-	(50.00%)	-	(12.50%)	(100%)
VI	-	-	3	-	-	3
	-	-	(100%)	-	-	(100%)
VII	1	-	2	-	-	3
	(33.33%)	-	(66.67%)	-	-	(100%)
Total	436	217	266	7	44	970
	(44.95%)	(22.37%)	(27.42%)	(0.72%)	(4.54%)	(100%)
Multi-authored	267 (44.72%)	147 (24.62%)	154 (25.80%)	5 (o.84%)	24 (4.02%)	597 (100%)
g	0.612	0.677	0.578	0.714	0.545	0.615

I to VII - Single authored to seven authored communications
g = group collaboration coefficient.

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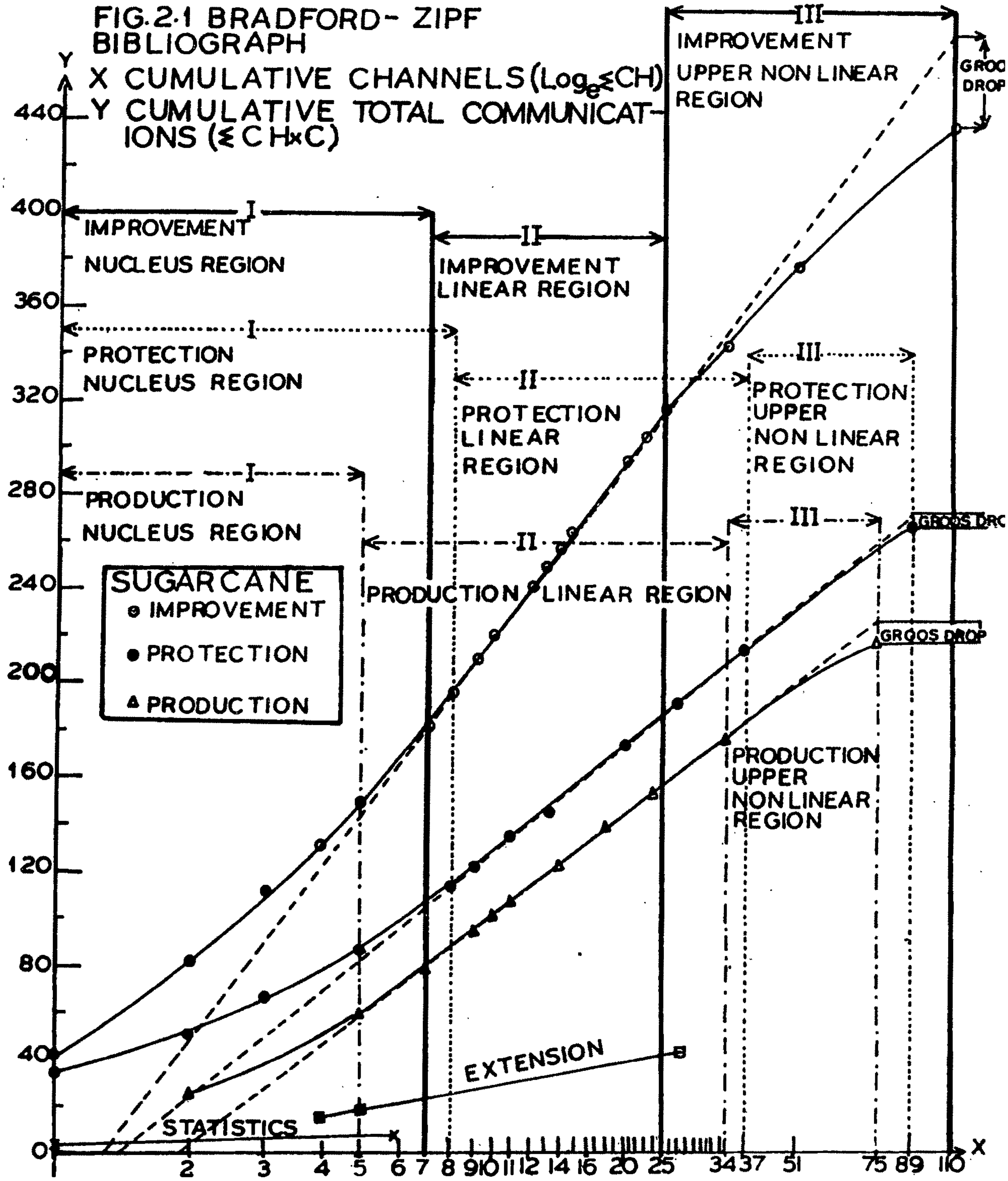

FIG. 2.1 BRADFORD- ZIPF BIBLIOGRAPH

High weighted communications per number of multiauthored communicators were found in breeding, tissue culture, physiology & biochemistry, agricultural chemistry, pathology and entomology.

High group collaboration coefficients were observed in breeding, mutation, tissue culture, agricultural chemistry and statistics.

Although group collaboration coefficients were higher in tissue culture, mutation and agricultural chemistry the weighted communication values were very low since only two authorship papers were predominant in these domains. Hence the group collaboration coefficient [2] alone will not be sufficient to characterise and explain the reality.

Total multiauthored communications from SBI were 597 and single authored communications were 373. Multi-authorship total for SBI was 1485, total authorships total was 1858 and weighted authorship total was 2082.

Crop improvement had a major share of 436 papers (Table 3) with 44.95 percentage and justified the main mandate of SBI, Coimbatore.

Crop protection accounted for 266 papers with 27.42 percentage share whereas crop production had 217 papers with 22.37 percentage share justifying their supportive mandates to breeders.

Communication Inputs per Communication: References cited at the end of a research paper indicate that those communications were related to or had an impact on the research undertaken and its results. The statistical parameters of mean communication inputs per unit of communication output and range of the number of communications cited are given in Table 4. The research communication cited by an author in producing his paper represents roughly valid indicators of the influence of the cited paper on his work and the information gathering habit of the author. However, it does not fully reveal the network of influence operating, or the quality of cited and uncited research work.

Core Channels

Twenty three core channels publishing 61 percent of the communications were identified. Top six favourite channels of communications for SBI constituted 51 percent of the communications published in core channels.

Communication scattering pattern with five or more number of communications per channel or communication concentration indicated availability of highly specialised periodicals for the domain as well as high level of specialized knowledge content in the communications being channelised as an output of specialised research activity.

When plotted as cumulative total of communications (Σ CH.C) against natural logarithm of the total of productivity channels ($\mathrm{Log}_e\ \Sigma$CH), the data revealed elongated S-shaped curves (Fig 2.1). Part one of the curve, the initial concave portion, represents the higher density or nuclear zone, part two - the linear portion of the curve and part three called the Groos drop [8] show the deviation from the normal which may be due to unpublished works in disciplines in the present context. Identical trend was found in sugarcane improvement, protection and production innovation communication productivity system outputs. Extension and statistics were just emerging domains and so have not yet shown any specialisation in their channels of communications.

Prolific Communicators

Out of 35 star communicators, the study iden-

Table 4.

Characteristics of Communication. Inputs per unit of Communication Output in Sugarcane Communications from Sugarcane Breeding Institute, Coimbatore during 1912-1987

Domain	Number of references Min.	 Max.	Variance	Standard deviation	Mean+Standard error
Botany	0	24	26.06	5.16	6.12+0.79
Genetic Resources	0	25	61.06	8.05	10.00+1.95
Breeding	0	21	29.19	5.44	6.84+0.62
Genetics & Cytogenetics	0	133	425.11	20.74	12.67+2.25
Mutation	1	24	46.97	7.16	9.17+2.07
Tissue Culture	0	24	69.84	9.34	11.6+4.18
Physiology & Biochemistry	0	49	82.76	9.19	10.47+1.34
Agricultural Chemistry	0	83	232.41	15.42	10.25+2.32
Agronomy and Soil Science	0	21	37.66	6.25	7.89+1.18
Pathology	0	54	116.90	10.89	9.27+1.29
Entomology	0	144	380.40	19.61	11.81+2.07
Nematology	3	19	45.19	7.76	9.25+3.88
Statistics	4	17	29.55	6.66	9.67+3.85
Extension	0	29	43.61	6.79	6.78+1.60

Table 5

Gender-wise number of communications and their Divergent Thinking Creativity Ratio (DTCR) during 1912-1987 at Sugarcane Breeding Institute, Coimbatore.

No. of communicators Female	 Male	Total SBI	DTCR
1	1	1	0.786
1	1	2	0.643
-	3	3	0.571
1	6	7	0.500
1	6	7	0.429
2	6	8	0.357
1	6	7	0.286
1	14	15	0.214
3	29	32	0.143
11	84	95	0.071

tified 7 spanners, 2 interdiscipliners and one discipliner in sugarcane improvement domain; 6 spanners, 3 interdiscipliners and one interdomainer in sugarcane production; one spanner, 2 interdiscipliners, one discipliner, 4 domainers and 2 interdomainers in sugarcane protection; only one spanner in sugarcane statistics and 3 spanners and one domainer in sugar extension domain.

Productivity-Domains Correlation

Out of 177 researchers 44 communicators (24.86%) contributed to only one domain since they had published only one paper each. 51 other domainers (28.81%) had multiple papers. Each one of the remaining 82 researchers (46.33%) produced multiple papers and also contributed to multiple domains. Communication productivity and their distribution paper-wise into number of domains to which they contributed group-wise were found out and Pearson Product Moment Correlations were recorded for each profile which indicated following stages in the evolution of innovation communication activity.

Very Low Productivity: A majority of the researchers (54.24%) are found to belong to this group. 82.29% of these researchers contributed to one, 14.58% contributed to two and two researchers contributed to three domains whereas only one researcher in this group contributed to four domains. The major group productivity is concentrated more in one domain and productivity is very low hence correlation +0.39 is observed.

Low Productivity: This group consists of 15.25% of the total researchers. Of them 33.33% contributed to only one domain, 40.74% contributed to two domains, 22.22% contributed to three domains. Only one communicator contributed to four domains. Since the majority contributed to two domains correlation +0.06 is observed.

Medium Productivity: 15.25% of the total communicators constitute this group. Out of them 22.22% contributed to only one, 22.22% contributed to two, 14.81% contributed to three, 11.11% contributed to four, 14.81% contributed to five, 7.41% contributed to six and 7.41% contributed to seven domains. In this case a diversification activity is initiated and -0.03 correlation is observed.

High Productivity: This group consists of only 8.47% of all communicators. The diversification of activities is prominent but their contributions are not proportionately distributed to all domains hence the correlation is -0.3.

Very High Productivity: Only 6.78% of the total researchers belong to this group. Further diversification of activities in proportion to their high contribution lead to +0.36 correlation.

Multiple-paper Authors' Productivity: This group consists of 75.14% of the total communicators. Analysis resulted in +0.73 correlation.

Total Group of Authors' Productivity: When the whole group of communicators is considered the correlation is strengthened due to a balanced activity of domainers and nondomainers and +0.77 correlation is observed.

Productivity-domains Significance: Correlations for communication productivity and contributions to a number of domains were highly significant for a very low productivity as well as multiple papers and total group productivity.

Unlike Subramanyam [9] and Gupta [4] who had obtained positive correlations and Hurt [10] who did not get any relationship in their respective studies, the present case study revealed both positive and negative relationships. Thus the group of productivity under consideration for analysis determines the correlation values.

Table 6

Theses output during 1912-1987 from Sugarcane Breeding Institute, Coimbatore.

Year	Ph.D.		M.Phil.		M.SC.		IARI		Total (SBI)		Total
	A	B	A	B	A	B	A	B	A	B	
1938	-	-	-	-	-	1	-	-	-	1	1
1941	-	-	-	-	-	1	-	-	-	1	1
1942	-	-	-	-	-	-	-	1	-	1	1
1944	-	-	-	-	-	-	-	1	-	1	1
1945	-	-	-	-	-	-	-	2	-	2	2
1947	-	-	-	-	-	1	-	-	-	1	1
1949	-	1	-	-	-	-	-	1	-	2	2
1955	-	-	-	-	-	1	-	-	-	1	1
1958	-	-	-	-	-	2	-	1	-	3	3
1959	-	-	-	-	-	1	-	-	-	1	1
1961	-	1	-	-	-	-	-	-	-	1	1
1964	-	1	-	-	-	-	-	-	-	1	1
1965	-	1	-	-	-	-	-	-	-	1	1
1967	1	-	-	-	-	-	-	-	1	-	1
1968	-	2	-	-	-	-	-	-	-	2	2
1969	-	3	-	-	-	1	-	4	-	8	8
1971	1	1	-	-	-	-	-	-	1	1	2
1972	-	1	-	-	-	-	-	-	-	1	1
1975	-	1	-	-	1	1	-	-	1	2	3
1977	-	1	-	-	-	-	-	-	-	1	1
1978	-	1	-	-	1	-	-	-	1	1	2
1979	-	1	-	-	-	1	-	1	-	3	3
1980	-	1	-	-	-	-	-	-	-	1	1
1981	-	3	1	-	4	1	-	-	5	4	9
1982	1	1	-	-	2	5	-	-	3	6	9
1983	1	1	-	-	-	7	-	-	1	8	9
1984	-	4	1	1	-	5	-	-	1	10	11
1985	-	2	6	1	-	10	-	-	6	13	19
1986	-	3	1	1	-	8	-	-	1	12	13
1987	-	3	-	-	-	14	-	-	-	17	17
Total	4	33	9	3	8	60	-	11	21	107	128

A = Female
B = Male

Table 7.
Domain-wise and genderwise distribution of theses during 1912-1987.

Domain	Ph.D		M.Phil		M.Sc.		IARI		Total (SBI)		Total
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	
Botany	-	1	-	-	-	3	-	5	- __	9	9
Genetic Resources	1	3	1	-	-	1	-	3	2 ----	7	9
Breeding	2	7	-	-	-	9	-	2	2 ----	18	20
Genetics & Cytogenetics	-	6	1	-	-	3	-	-	1 ----	9	10
Mutation	1	2	-	-	3	1	-	-	4 ----	3	7
Tissue culture	-	-	2	-	2	-	-	-	4	-	4
Physiology & Biochemistry	-	2	1	1	1	10	-	-	2	13	15
Agricultural Chemistry	-	3	1	2	-	5	-	-	1	10	11
Agronomy & Soil Science	-	4	-	-	-	8	-	1	-	13	13
Pathology	-	2	1	-	2	6	-	-	3	8	11
Entomology	-	2	2	-	-	7	-	-	2	9	11
Extension	-	1	-	-	-	7	-	-	-	8	8
Toial	4	33	9	3	8	60	-	11	21	107	128

Genderwise Participation

Genderwise number of communicators and their divergent thinking creativity ratios are tabulated in Table 5. Women communicators numbered only 21 against 156 men. All women were good followers and invariably collaborators with the prolific innovation communication stars, who happend to be their mentors. Participation in joint authorships revealed equal participation in nematology and tissue culture domains by both male and female scientists.

The productivity communications in the form of theses from SBI by males and females during the period under consideration is tabulated in Tables 6 & 7.

A comparison with world literature production on sugarcane by Lovett [12] of the present study clearly highlighted that the independent scientific tradition' had quite an early setting at SBI, Coimbatore. This may be probably due to climatic advantage as flowering and seed-set at Coimbatore (11° N latitude) is very congenial. Although all the domains have a great number of researchers and produce a greater number of communications, it is generally accepted that the latent time for the production of a unit of communication is more for sugarcane breeding than entomology, pathology and genetics & cytogenetics. Since the time taken by breeders in field experiments is always longer, the other domains have the advantage of controlled laboratory experiments requiring a shorter duration. Sugarcane breeding depends partly on luck and partly on hard work. Luck was a major factor in the finding of variety Co 205.

CONCLUSION

The objective was to give a brief insight into the communication productivity of SBI researchers. The study can be extended to quinquennial reviews of researchers and their establishments for a comparative study with other sugarcane research groups in the country or at an international level. Similar reports from all over the world wherever sugarcane research is conducted may lead to a global view of the innovation communication status. Similar work can be undertaken on sugarcane research in the country or other crops or research areas of concern. Such studies can help to strengthen the interaction of scientists at the national and international level since they highlight strong research expertise in various fields at a particular location. Scientometric tools may enable coordinating the efforts of the research institutions of the country, to converge scientific efforts and resources on a definite range of problems and avoid unnecessary duplication of projects.

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PRICE TRENDS IN POLITICAL SCIENCE AND ECONOMICS JOURNALS DURING 1980-1988.

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Discusses the importance of the serials in the present day world. Points out the constant price rise of the journals. Increase of 300 % and 249% in the prices of the periodicals in political science and economics respectively was observed within a period of 9 years from 1980-1988. States the implications of the study and cites some crucial factors responsible for the price rise of journals.

INTRODUCTION

Serials are the most important and vital source of communicating information. The latest developments, achievements, and advancements in the field of social sciences, humanities and science and technology, etc. are recorded in journals, periodicals, reports, etc. Research is the order of the day. It is being carried out in all fields for the progress and uplift of the nation. Serials are the life-blood of research scholars who are constantly engaged in research in universities, research institutes and other organizations.

However, the libraries are not in a position to acquire each and every journal needed by the users due to the constant rise in their price, inadequate library budget and the intensity of research in interdisciplinary areas. All these factors along with the restrictions on foreign exchange pose major hurdles in the acquisition programme of the libraries in universities, information centres and research institutions. Inflation is another factor contributing to the reduction in the number of journals subscribed every year.

SCOPE

This article attempts to study the trend in price rise for some sample titles of political science and economics journals over a period of 9 years (1980-1988).

METHODOLOGY

Twenty journals each in political science and economics were selected at random (Appendix 1). The prices of the journals were noted from the bill register of 1980-88. The information about prices was also crosschecked from the Ulrich's International Periodicals Directory. Out of the 20 journals in political science, 10 are published in India, 5 in England, 3 in U.S.A. and one each in Australia and France. In the case of economics, 7 journals are published in India, 6 in England, 4 in U.S.A. and one each in Japan, Australia and Switzerland.

Table 1 shows the comparative figures of total annual cost of 20 journals in political science and economics, average annual price, percentage increase per year and the percentage increase over 1980. Figures 1 and 2 show the trend in price rise and the comparison between the prices in two consecutive years. Linear Regression model was applied using the least square method to evaluate the trend in price rise. Table 2 indicates the observed and expected values of journals in rupees from 1980-88. Fig.3 shows the linear regression of the journal prices over 1980-1988.

ANALYSIS

It is observed from Table 1 and Figs.1 and 2 that the average price of the political science journals was Rs. 198/- in 1980 and it doubled in five years and again in the next three years. Similarly in the case of economics journals the price doubled in 4 years and is likely to be doubled again in the next 5 years on the basis of the recurring increase in each year from 1985 to 1988. And the percentage increase in the prices of the journals of political science and economics for the period 1980-88 was 300 and 248.8 respectively. Further, the average percentage increase in the journal price is observed to be 274.4 for all the 40 journals which are under consideration.

The maximum increase was observed in 1988 in these two categories of journals. The mode of increase in the price of the journals in political science from 1980 to 1986 is uniform except for 1983. However, it was noticed that there is a continuous trend of increase in price in each year. In the case of economics journals also, there was annual increase in the prices but the mode of increase was not uniform. The average price increase of 17.3% and 15.38% per year was observed in the journals of political science and economics respectively. The expected values of the journals in political science and economics for a given year between 1980-88 are calculated by applying the regression equation. The regression equation is expressed as follows:

$$Y = a + bx$$

Where `a' and `b' are real constants, `b' is calculated by using the formula:

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

Where
x : year
y : observed price
n : sample size

a' is calculated by using the formula

$$a = y - bx$$

where x : average value of year
y : average value of observed price

The filled regression equation becomes $y = 78.05 + 61.95\,x$ for political science and $y = 150.717 + 57.3x$ in the case of economics.

SY. x, i.e. the standard deviation of Y for a given x is as follows:

$$SY.x = \sqrt{\frac{(y - \hat{y})^2}{n - 2}} = \sqrt{\frac{\sum y^2 - a\sum y - b\sum xy}{n - 2}}$$

where $Y_i = \hat{a} + \hat{b}x_i$ is the expected value of y_i. $i = 1,2,\ldots\ldots n$, and $n = 9$

The calculated standard error in the estimated prices of the journals in political science and economics are 79.13 and 29.722 respectively.

The percentage increase over 1980 and the annual percentage increase given in Table 1 is represented graphically in Figs. 1 & 2 respectively . Table 2 is also represented graphically in the Fig.3.

Fig. 3 reveals that the observed and expected data are close to each other and hence the linear relation model is appropriate.

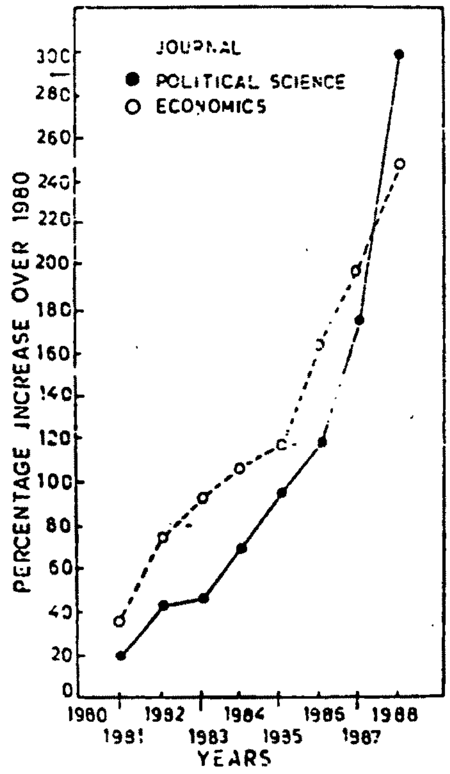

Fig.1 Percentage increase over the year 1980 for Political science and Economics journals: 1980–1988.

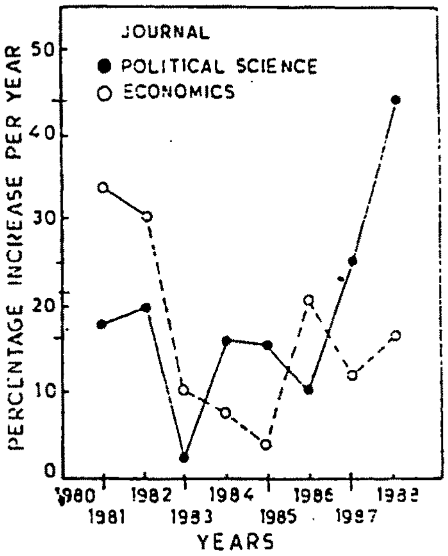

Fig. 2 Percentage increase per year for Political science and Economics journals : 1980 – 1988.

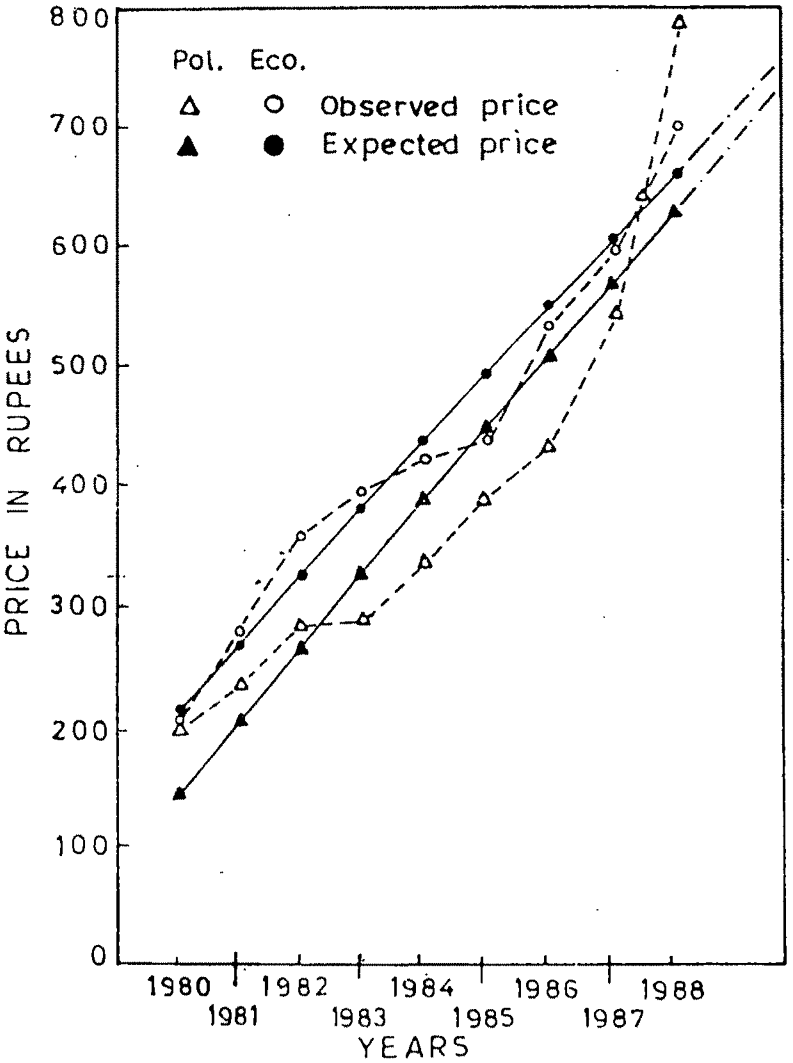

Fig. 3 Linear regression of journal prices on years.

Table 1
Comparative Figures Representing Increase in 9 years.

	1980	1981	1982	1983	1984	1985	1986	1987	1988
POLITICAL SCIENCE									
Cost of 20 journals	3957	4672	5619	5760	6694	7780	8666	10927	15848
Average cost	198	234	281	288	335	389	433	546	792
Difference	-	36	47	7	47	54	44	113	246
Percentage increase	-	18.2	20	2.5	16.3	16.2	11.3	26.1	45.1
Percentage increase over 1980	-	18.2	41.9	45.5	69.2	96.5	118.7	175.8	300
ECONOMICS									
Cost of 20 journals	4056	5436	7073	7824	8433	8831	10710	12106	14157
Average price	203	272	354	391	422	442	536	605	708
Difference	-	69	82	37	31	20	94	69	103
Percentage increase	-	34	30.1	10.5	7.9	4.7	21.3	12.9	17
Percentage increase over 1980	-	34	74.4	92.6	107.9	117.7	164	198	248.8

Table 2
Observed and Expected Values of Journals in Rupees (1980-88).

Year	Political Science		Economics	
	Observed (y)	Expected (y)	Observed (y)	Expected (y)
1980	198	140	203	208
1981	234	204	272	265
1982	281	264	354	322
1983	288	326	391	380
1984	335	388	422	437
1985	389	450	442	494
1986	433	512	536	552
1987	546	573	605	609
1988	792	636	708	666

IMPLICATIONS AND CONCLUSION

The price rise of the journals under survey have clearly demonstrated that the library will incur more expenditure in the coming years for the journals in various disciplines. The librarian has to plan the library budget cautiously and judiciously for the coming years for purchase of journals. Either the library has to enhance the existing allocation in budget for purchase of journals or stop subscribing some of them . The librarian has to conduct a survey for the potential use of the acquired journals by the readers so that some of the un-used or less used journals may be deleted to make adjustments for the increased price of journals and to make the collection more user responsive.

There are a number of factors responsible for the price rise of the journals, some of them can be enumerated as follows:

a) Growing demands for learned and standard journals.
b) Increasing cost of sophisticated and advanced printing machinery and mechanical binding of journals and enhanced salary and wages for the skilled and technical personnel for publication of journals in most of the printing presses.
c) The overall inflation and devaluation which effects all spheres of life.

To conclude, the study will help the librarians to understand the implications of sharp rise in the prices of journals in various subject areas. The problem of journal price inflation may be presented to the concerned authorities to get a suitable allocation of budget for acquiring the required journals to meet the evergrowing and diversified needs of various types of readers.

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3. Ulrich's International Periodicals Directory - a Bowker Serials bibliography 16-24th edition, New York, R R Bowker company, 1975-85.
4. Omotoso R O : Price trends in geophysics journals 1975-85. IASLIC Bull 1988, 33 (1), 1-5.

List of journals

APPENDIX-1

Political Science

1. American Journal of International Law.
2. Annals of the AAPSS.
3. Australian Journal of Politics and History
4. Civic Affairs.
5. Comparative Political Studies.
6. Documentation in Public Administration.
7. Frontier.
8. Government and Opposition.
9. Harvard International Law Journal.
10. Indian JOurnal of International Law.
11. Indian Journal of Political Science.
12. Indian Journal of Public Administration.
13. International Affairs.
14. International and Comparative Law Quarterly.
15. International Political Science Abstracts.
16. Journal of Constitutional and Parliamentary studies.
17. Journal of Indian Law Institute.
18. Journal of politics.
19. Political Studies.
20. World Today.

Economics

1. American Economic Review
2. Anvesak.
3. Arthavijana.
4. Arthavikas.
5. Econometrica.
6. Economica.
7. Economic Journal
8. Economic Record.
9. Indian Economic Journal.
10. Indian Economic Review.
11. Indian Journal of Agricultural Economics.
12. International Economics Review.
13. I.M.F. Staff papers.
14. Journal of Economic Literature.
15. Journal of Industrial Economics.
16. Journal of Political Economics.
17. Kyklos.
18. Oxford Economic Papers.
19. Review of Economic Studies.
20. Southern Economist.

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BOOK REVIEW

Guha B: A synopsis of the report on the feasibility study on automation and networking of science and technology libraries at Calcutta (CALIBNET) prepared by CMC, Limited, Delhi 1989. (Reviewed by J.K. Ahluwalia)

The Government's concern for the improvement of libraries and library services has been clearly highlighted through setting up of a number of committees since independence. Among these, special mention may be made of the Dr. V.A. Kamath Committee which in its report submitted in 1972, recommended the establishment of science and technology library in Calcutta. This recommendation was considered by several agencies and lead to the organisation of an important meeting at the institute of Radiophysics and Electronics, Calcutta under the chairmanship of Director General, CSIR. In the meeting, it was felt that it would be better to facilitate improved access to the existing resources within the region and thereby recommended automation and networking in the libraries.

National Information System for Science and Technology (NISSAT), New Delhi took up the responsibility of initiating the network (CALIBNET)..CMC Ltd. was entrusted by NISSAT to conduct a feasibility study on computer automation and networking of science and technology libraries at Calcutta. CMC submitted an exhaustive report keeping the following in consideration: (a) Identify information needs of individual libraries in Calcutta, (b) Assess the feasibility of computer network for a library automation system, (c) Arrive at the specifications of hardware, system software, communication and infrastructural requirements for the proposed network, (d) Arrive at an appropriate plan for the proposed network, (e) Prepare an estimate of investment for the proposed network, (f) Estimate the training requirements for the library operational staff. The study covers 35 libraries of science and technology big and small, in the Calcutta Metropolitan Area, i.e. the libraries is Jadavpur, Chowringhee, Rajabazar and Ballygunge areas. Some libraries situated outside this cluster, i.e. National Library, ISI Library and some medical libraries are also included.

The functions that are to be automated included cataloguing, serials control, acquisition, fund accounting, circulation and local user services. The network centre would provide for all services such as current awareness, SDI, Union Catalogue, partial databases and access to national and international networks. Apart from these the reprographic facilities, preservation requirements and document transfer facilities have also been discussed and suggestions are made.The network applications designed to be supported are electronic mail, file transfer, remote logon and database access along with document exchange. The use of P & T lines is recommended as transmission media in phase I. After Phase I, an appropriate choice will be made of the transmission media for WAN networks for inter-city and international lines.

In the proposed scheme, each institution will hold processed information on local computers connected with each other through X.25 packet switched network. It is suggested that computer system at Regional Computers Centre at Jadavpur will be used as central host. The detailed estimate of expected workload for each of the participating libraries has been provided.

The necessary requirement of hardware and software have also been spelt out. Emphasis on deployment of manpower with adequate skill and motivation to run automated libraries is given. Staff requirements and the need for necessary training are indicated. The entire work is proposed to be carried out in two phases. In the first phase all libraries in Jadavpur University Cluster and some nodes at Rajabazar are to be covered. In the second phase, libraries of Ballygunge Science College, remaining libraries of Rajabazar cluster, libraries of chowringhee cluster, medical libraries, the National library and the ISI library are to be brought into the network.

The cost of entire project is estimated at Rs. 233.8 lakhs out of which Rs. 63.1 lakhs is the expected expenditure in Phase I and Rs. 170.7 lakhs for Phase II. The estimated annual operating expenses are in the tune of Rs. 34.6 lakhs in Phase I and Rs. 80.7 lakhs in Phase II.

The synopsis of the report runs into 55 pages giving sufficiently detailed description about the participating libraries, functions to be automated, traffic load, software, hardware and budgetary requirements in both the phases. The synopsis is a handy publication and furnishes a useful peep into the study conducted and its far reaching significance.

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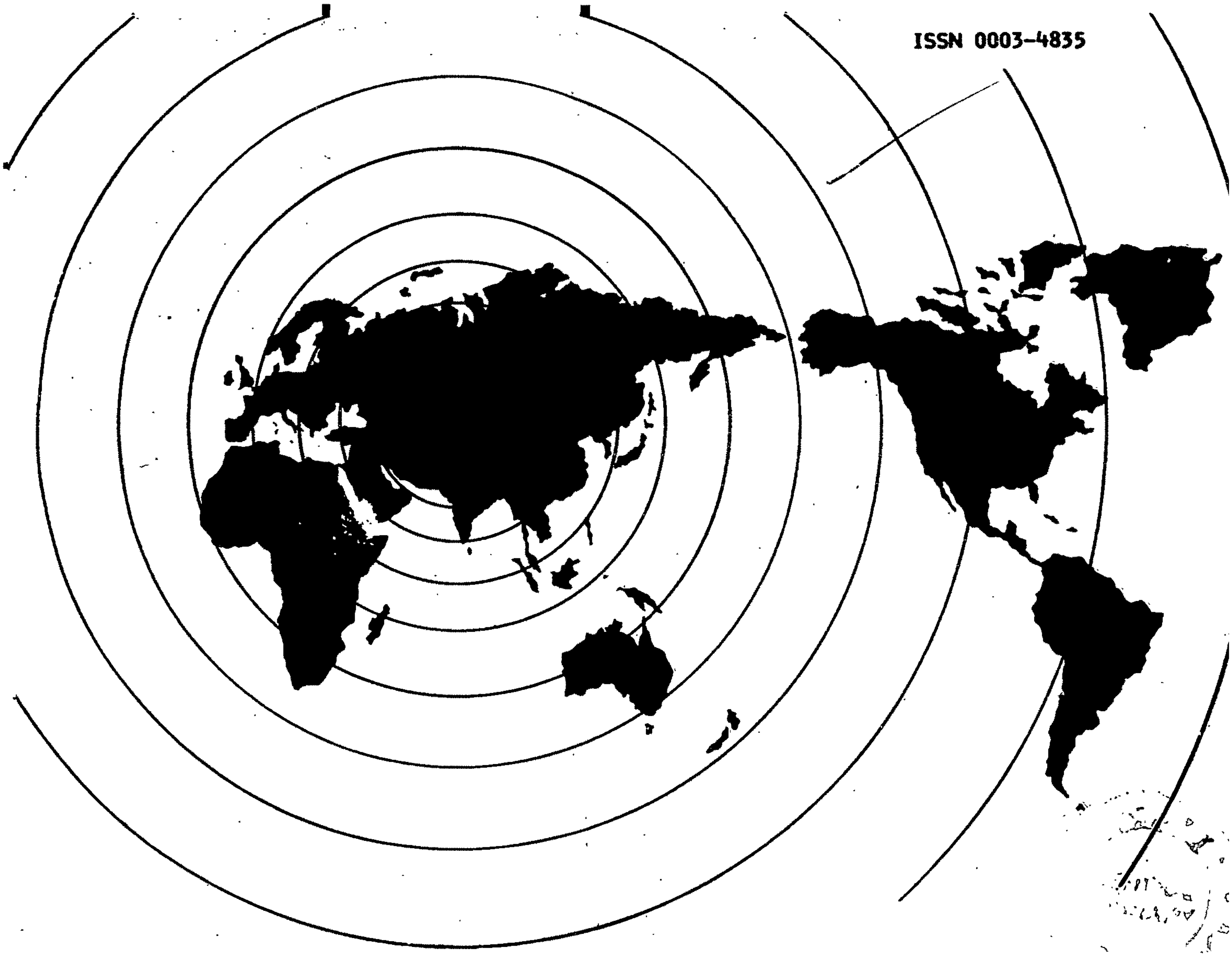

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LIBRARY NETWORKS IN INDIA

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INTRODUCTION

The importance of information as a vital resource in today's society hardly needs to be emphasized. The increase in information generation at an estimated rate of 13% per annum has made the task of collection, organisation and retrieval of information very difficult. In addition, the escalating costs of information products and services have made it mandatory for libraries to automate their services, and share the resources through networking. This is important for developing countries with severe constraints in financial resources. In India, the need for resource sharing has been recognised and suitable options are being explored. Resource sharing can help in avoiding unnecessary duplication of costly books, periodicals, etc.

In 1986 a national policy on library and information system was formulated wherein it was recommended that the national libraries should form an integrated system for a better coordination of their activities and services. The Planning Commission had set up a working group on modernisation of library and information services for the Seventh Five Year Plan (1985-90) to suggest measures to network important libraries in the country so that their resources could be shared for optimum utilisation. The outcome of this was the UGC report on Information and Library Network (INFLIBNET) which proposed a mechanism to establish a network connecting universities, colleges, documentation centres, etc. in the country through the use of computer communication technology.

The National Information System for Science & Technology (NISSAT) under the Department of Scientific and Industrial Research (DSIR) initiated a feasibility study for the automation and networking of about 38 libraries in Calcutta and 35 libraries in Delhi by CMC Ltd, a public sector company.

INFLIBNET (Information and Library Network)

India has 184 universities and 23 institutions deemed to be universities. About 6100 colleges are attached to these universities. The institutions of higher learning have 3.58 million students enrolled for graduate, post-graduate and research degrees. INFLIBNET is a co-operative networking effort of the University Grants Commission and is a computer communication network linking libraries and bibliographic information centres all over the country. INFLIBNET is expected to improve information transfer and provide the scholars and researchers an easy access to information. Major institutions of higher learning and national organisations like Council of Scientific & Industrial Research (CSIR), Indian Council of Agricultural Research (ICAR), Defence Research & Development Organisation (DRDO), Indian Council of Medical Research (ICMR), Department of Atomic Energy, Department of Electronics (DOE), Department of Telecommunication (DOT), Indira Gandhi Centre of Arts, etc. are participating in INFLIBNET.

Though the libraries attached to the institutions of higher education spend over 1.5 billion Rupees per year for purchase of books and journals, the researcher is gravely handicapped due to paucity of resources and services in the libraries. It is not practical to make all libraries self sufficient for the users belonging to multifarious disciplines. If users can be provided access through a network to the holdings of other libraries situated at geographically different places. the national resources are put to an optimum use and simultaneasly, it is ensured that the libraries can avoid duplication in procuring costly publications. Additionally, the academic communities in the country can establish instant contact with each other for information exchange.

INFLIBNET is a multi-service network, offering

- Catalogue based services,
- Database services,
- Document supply services,
- Communication based services, etc.

and operating at four different levels:-

- National,
- Regional,
- Sectoral and
- Local

The national Centre will coordinate the activities and services of the network.

Each of the four regional centres will be housed in the University libraries of the region and will maintain union catalogues of the libraries in the region.

The Sectoral Information Centres will take care of the maintenance of retrospective bibliographic databases in specific missions or subjects.

The end users will be served mainly at the local level, i.e. the nodes at colleges, departments, universities and R&D institutions. 400 such nodes are planned initially.

Separately, 100 Document Resource Centres in various university and R&D institutional libraries are proposed to be set up for document delivery service (Fig 1).

INFLIBNET will evolve standards based on the existing national and international practices for uniform adoption throughout the network. These relate to 16 areas like classification, subject heading, cataloguing, input format, exchange format, physical format, information processing, etc.

A hybrid version of satellite and terrestrial networking will be used as its communication system. The communication system will have a central node and 400 ground terminals at 150 university libraries, 50 autonomous colleges and 200 other institutions including R&D institutions. The Document Resource Centres and Sectoral Information Centres are to be interconnected via satellite links. Nodes in a city will be connected through Local Area Network (LAN). About nine million unique catalogue records of 179 university libraries will be unified into a common catalogue database.

CALIBNET (Calcutta Libraries Network)

CALIBNET is envisaged to cover 38 science and technology libraries, big and small, in Calcutta Metropolitan area. From the point of view of spatial distribution, most of them are found to be clustered in the Jadavpur, Chowringhee, Rajabazar and Ballygunge areas. A few libraries such as the medical libraries, the National Library and the library of Indian Statistical Institute (ISI), are located outside these clusters. The constituent libraries of the proposed network are expected to be first automated and then networked.

Within the individual or nodal libraries, the functions that are to be automated are cataloguing, serials control, acquisition, fund accounting, circulation and local user services. The network centre would provide services such as Current Awareness, SDI and Union Catalogue, and access to National and International networks. The main features of CALIBNET are - online/offline input, editing, and retrieval of records. Users will be able to access databases in real time using real time software. System will allow online requests for documents.

MARC format and AACR2 are recommenended for creating the inhouse catalogue records and CCF, which is compatible to the ISO - 2709 for exchange of bibliographic data among the participating institutions.

CALIBNET has been envisaged as a Metropolitan Area Network (MAN). Entire network is proposed to be carried out in two phases. In phase 1, institutions in the Jadavpur and Rajabazar clusters are to be covered. In phase 2, all other clusters and stand alone institutions will be connected to the network (Fig. 1&2). The library network at Calcutta will be connected to similar networks in Delhi, Bombay, Madras and other major cities using intercity PSDN. The network will have access to the

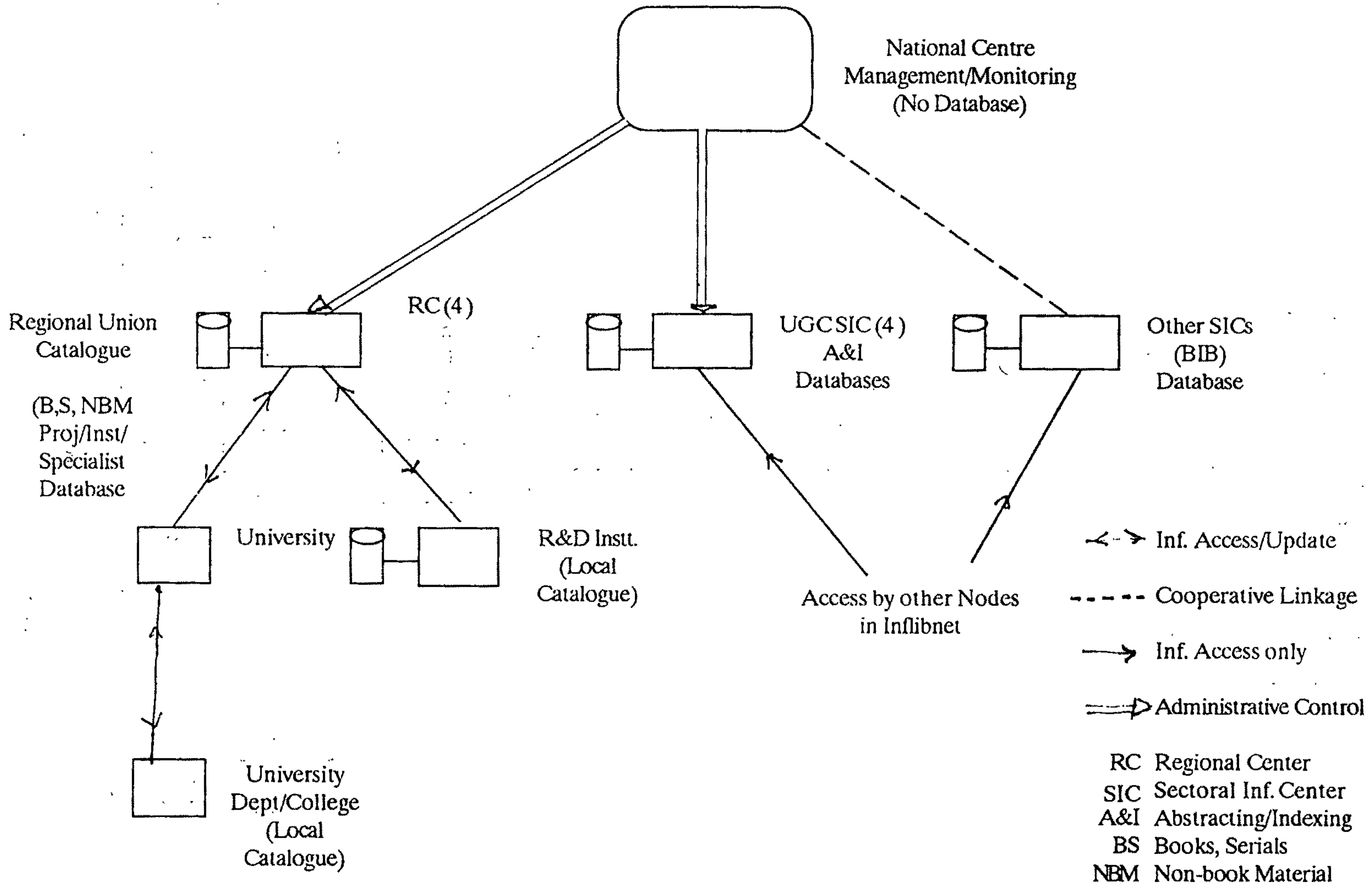


Fig. : 1 INFLIBNET Information Organisation

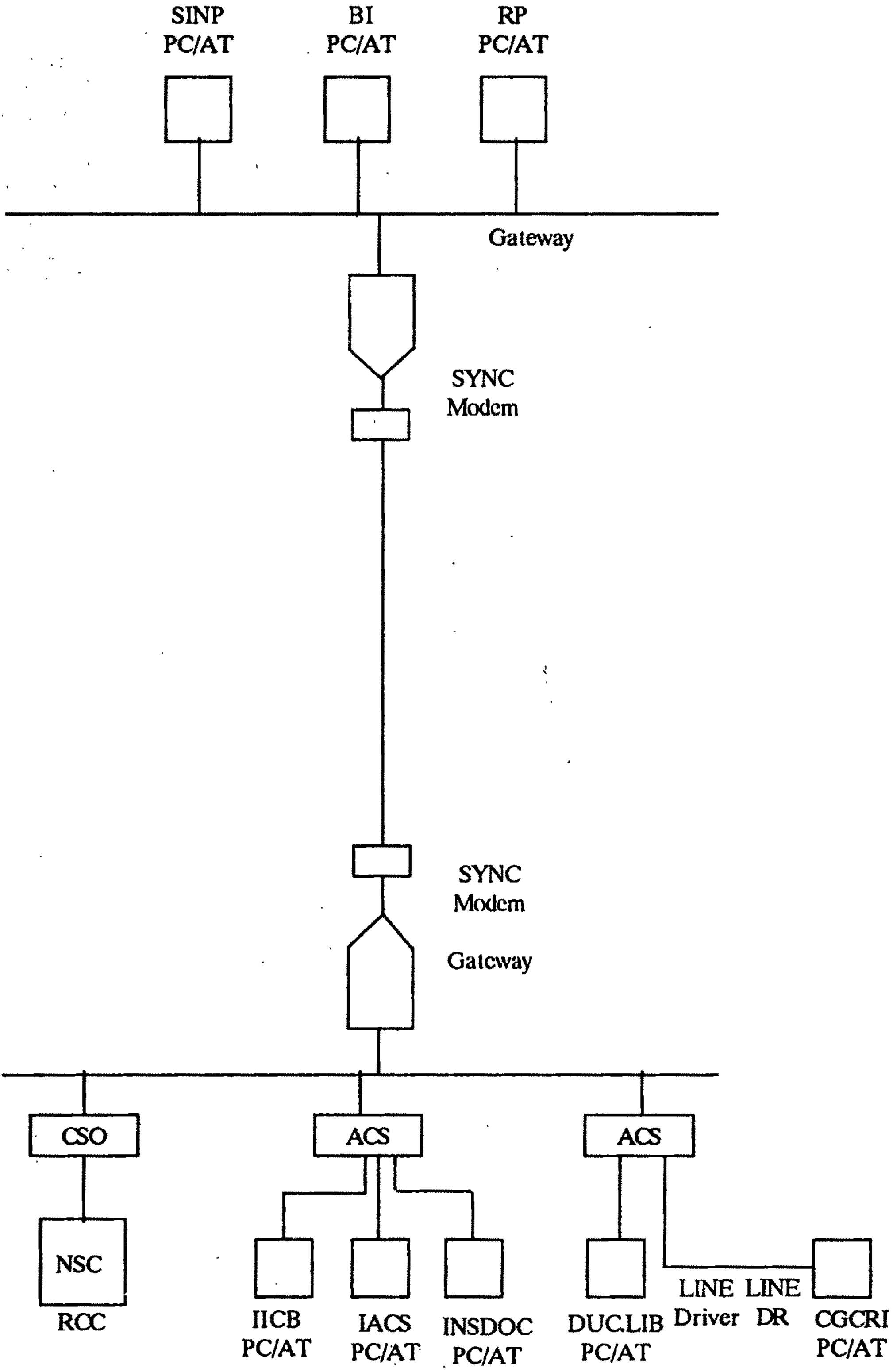


Fig. 2 : CALIBNET Conectibity Phase 1

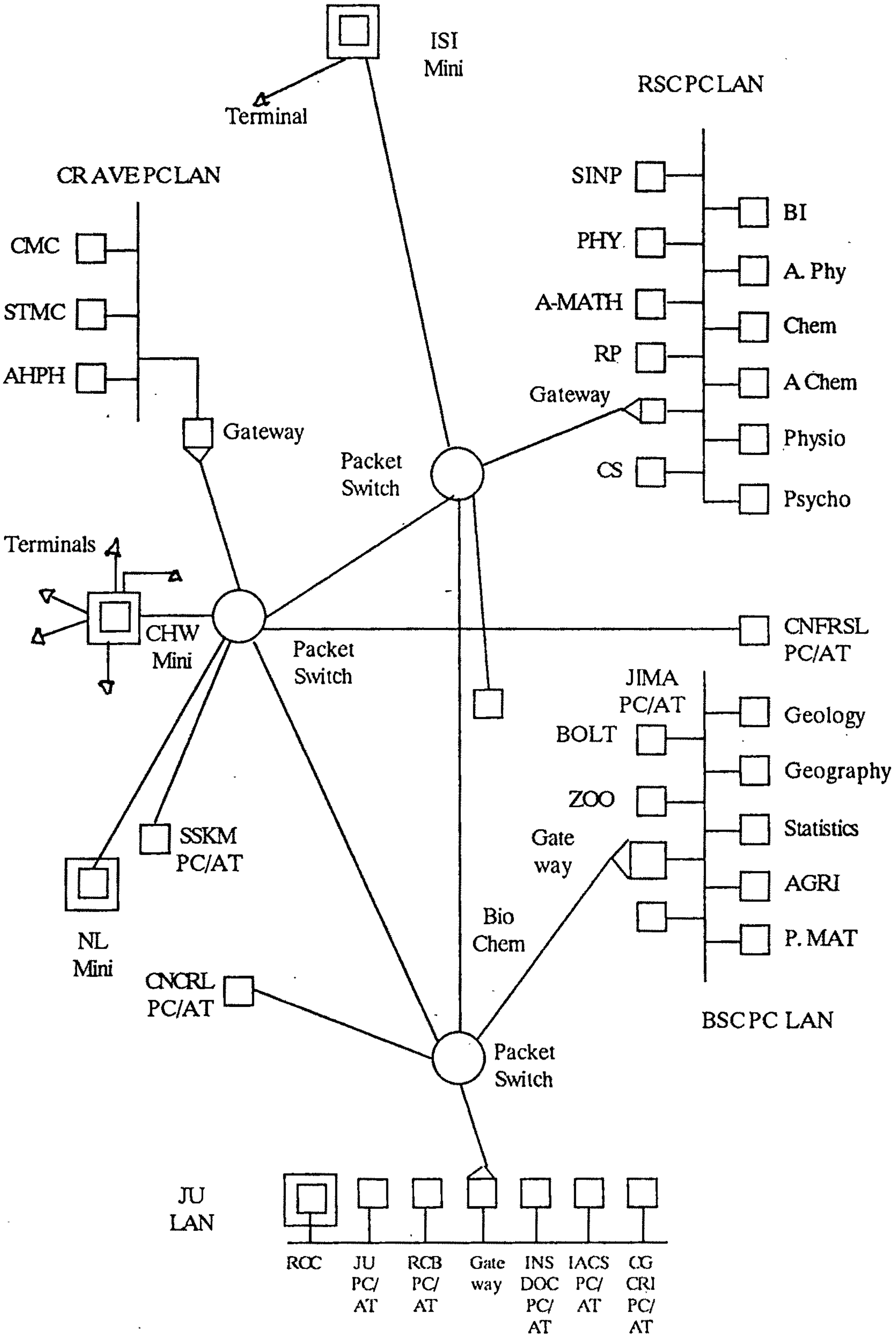


Fig. 3 : CALIBNET Connectivity Phase 2

International Gateway of Videsh Sanchar Nigam Ltd (VSNL) , a Govt. of India enterprise, Bombay through Indian Public Switched Data Networks (PSDN).

DELNET (Delhi Libraries Network)

The main objectives of DELNET are optimum utilisation of funds through sharing of resources, creation of commonly usable databases and communication between libraries with the help of automation and networking.

A packet switching network has been proposed for online communication requirements. The library systems are proposed to be connected to the packet switch with respective X.25 network interface units and to use the corresponding software.

The following transactions are envisaged among libraries within the network :

- Remote login;
- Batchmode;
- Interlibrary loan service;
- File transfers; etc.

It has been proposed initially to use the dial up mode for the required information exchange among the systems in phase I (Fig.4).

The main features of the network are as follows:

- A dial up modem is proposed for every library with an asynchronous port connected to it for information exchange.
- Users of the system would be provided with file transfer, electronic mail and bulletin board services in the batch mode.
- Requests for interlibrary loan and other official communications will be supported on E-mail.

The union catalogue and other related databases will reside on a central computer system which would be capable of providing multiple data paths to all the systems connected to it.

The network topology has been designed on the basis of the physical locations of the libraries and the flow requirements of the data (Fig.5).

At present 35 libraries are expected to participate in DELNET.All the participating libraries are expected to create the databases of monographs and serials using CDS/ISIS and CCF. A database of union catalogue of serials available in the participating libraries has been created at JNU. A central hub has been established at NISSAT. At present the libraries can make use of E-mail facility through dial up modems.

SIRNET (Scientific and Industrial Research Network)

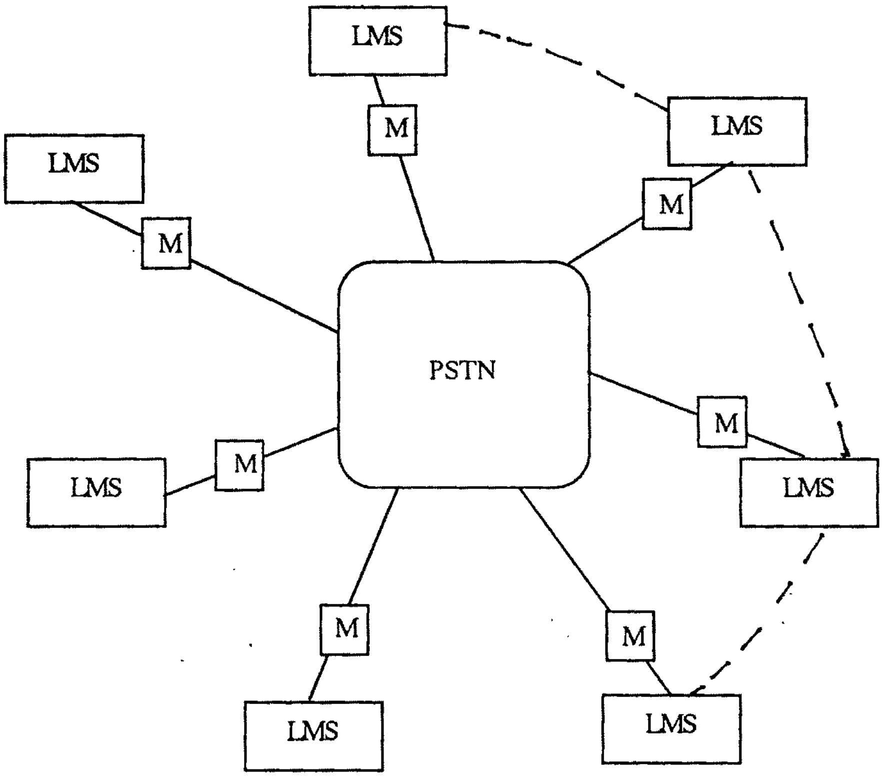
SIRNET is proposed to interconnect all the CSIR laboratories and other R&D institutions of India.The main objective of SIRNET is to harness the vast S&T information resources available with national laboratories and inculcate the habit of resource sharing among them. The ultimate aim of the SIRNET is to link the entire scientific community of the nation with the national library system and the international links to achieve efficient scientific communication. SIRNET is proposed to have a four layer architecture.

The first layer is a backbone node network with a cross topology spanning the length and breadth of the country and carrying high speed traffic from different parts of the country.

Second layer constitutes the city nodes. The city node will act as a clearing house for the traffic originating/terminating in the city in which it located. The city nodes are located in the cities with more than one laboratory and no backbone node.

At the third layer the individual CSIR laboratories are laboratory nodes which may directly be connected either to the city or to the backbone nodes.

The fourth layer consists of the local end users who may also be connected either to the city or to the backbone nodes. The system is based on UUCP protocols for communication using dial-up telephone lines (PSTN--Public Switched Telephone Network). All the nodes of SIRNET are UNIX machines except user nodes (Fig.6). SIRNET architecture specifies the use of PSTN dial-up



M - Dial up Modem
LMS - Library Management System
PSTN - Public Switched Telephone Network

Fig. 4 : PhaseI - Configuration

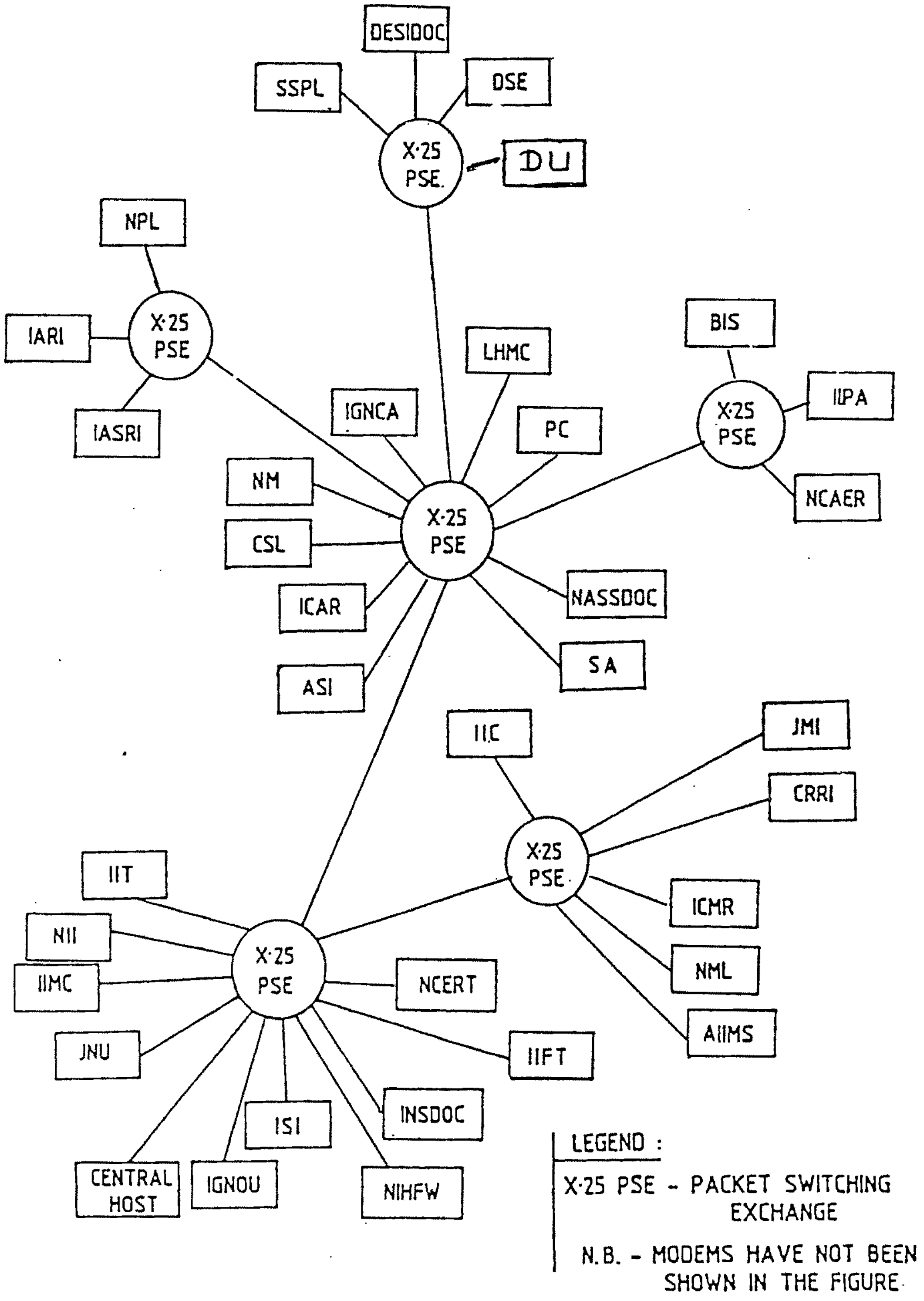
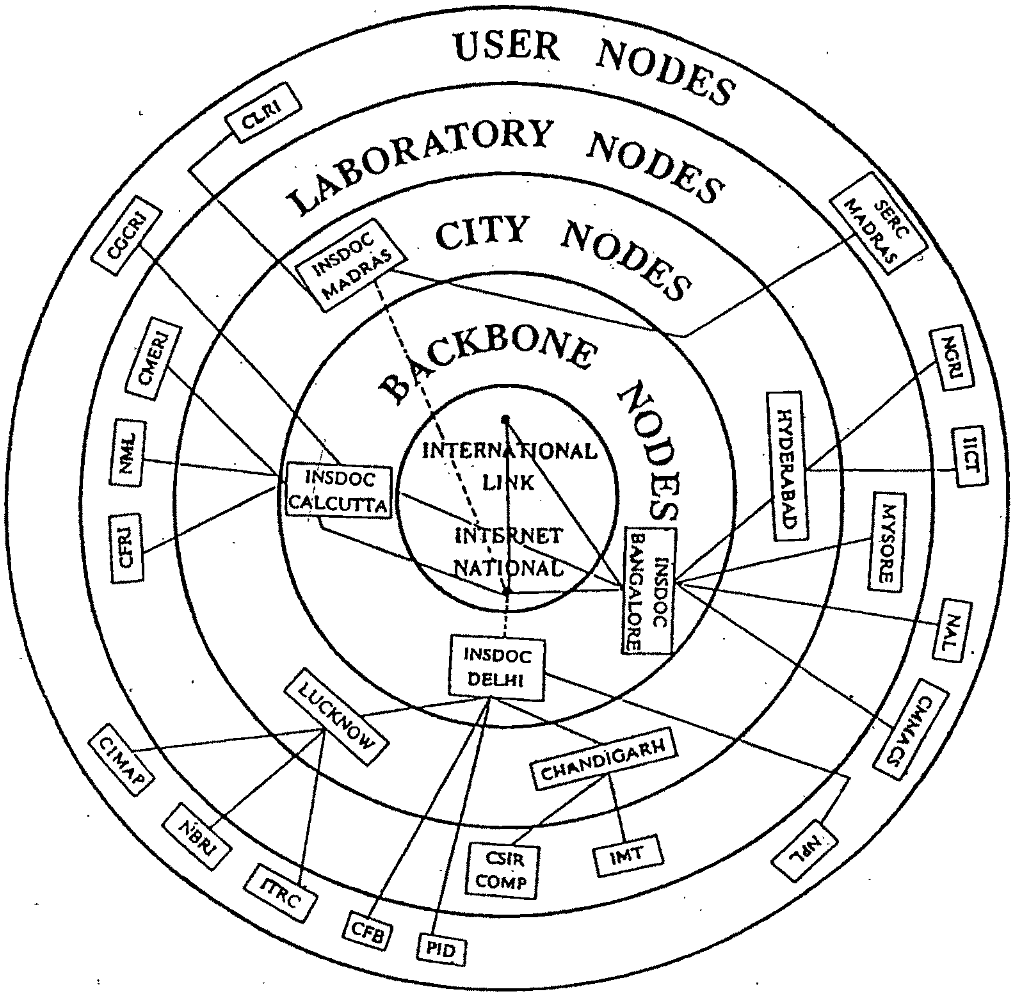


FIG.5 PHASE II CONFIGURATION



SIRNET LAYERED DESIGN

Fig.6

SIRNET E-MAIL SETUP

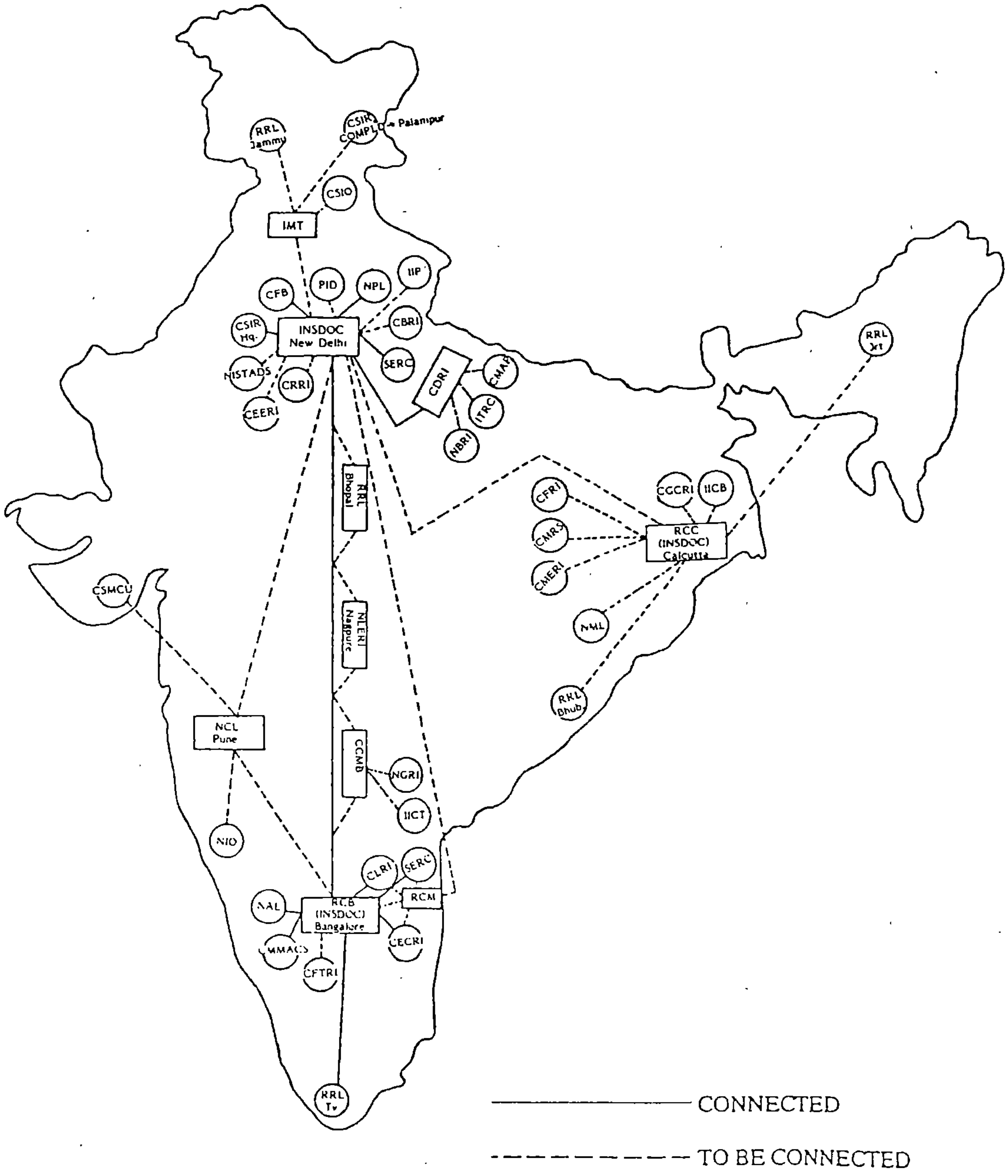


Fig. 7

technology or PDN packet switched or the dedicated lines technology.

The following services are proposed to be available on SIRNET:

- Electronic mail,
- File Transfer,
- Document Transfer,
- Search and other Information Services etc.

Electronic Mail

SIRNET is being implemented in a phased manner. In the first phase Electronic Mail has been implemented bringing high pitch response from all CSIR laboratories. The other R&D institutions of the country are also coming up on the network (Fig.7).

File Transfer

The transfer of files from one machine to another is an integral part of a computer network. The file may be an ASCII file, a binary file, or a text file. Presently, only ASCII files can be transferred by UUCP protocol and the SIRNET protocol will enable both the ASCII and the binary files to be transferred in due course.

Document Transfer

Computer communication technology would be utilised for document transfer. The facsimile transmission, used presently, is not recommended on network because of the heavy expenditure involved in it.

Access to Indegenous Databases

To support R&D activities of the nation, INSDOC is designing and developing databases in various disciplines of science. Following databases are at present available online through direct dial-up mode:

- National Union Catalogue of Scientific Serials in India
- Current Contents of Indian Journals (ISCOMM)
- Polymer Science Database
- Material Science Bibliographic Database
- Catalogue of Scientific & Technical Conference Proceedings

INTER NETWORKING

INSDOC, Delhi node of SIRNET (csird) acts as a gateway to a larger network ERNET (Education and Research Network) set up by the Department of Electronics with the financial assistance from UNDP and providies an E-mail facility to 20 non-CSIR institutions. ERNET in turn is connected to the international network UUNET through which other international networks like BITNET, EARN and JANET can be accessed. So much so that it is possible to access over 6000 databases all over the world through a gateway Packet Switching System (GPSS) of the Videsh Sanchar Nigam Ltd. (VSNL). Direct access to these databases is available from Bombay, Delhi, Madras, Bangalore, Hyderabad, Pune, etc. INSDOC has established access to over 1800 international databases on 15 different hosts through VSNL - GPSS facility.

I-NET, the network of the Department of Telecommunications of the Government of India, offers facilities for interlinking terminals and computers through packet switches located in important cities of the country.SIRNET will eventually operate through I-Net, which is the main national data network. I-Net also provides access to international data networks through GPSS of VSNL, at Bombay (Fig.8).

SAARC INFORMATION NETWORK (SARINET)-A PROPOSAL

India has gained sufficient expertise in the field of networking. Since mid-80's there has been considerable amount of efforts and achievements in computer networks in the country. The telecommunication infrastructure has advanced to a level where it is capable of supporting networking activities, both nationally and internationally. Currently, there are over a dozen networks either operational or under implementation in the country includeing RAILNET, COALNET, OILNET, BANKNET, SAILNET etc. and the Information networks like INFLIBNET, CALIBNET, DELNET, SIRNET etc. Thus India is in a position to establish, operate and manage an information network to link the

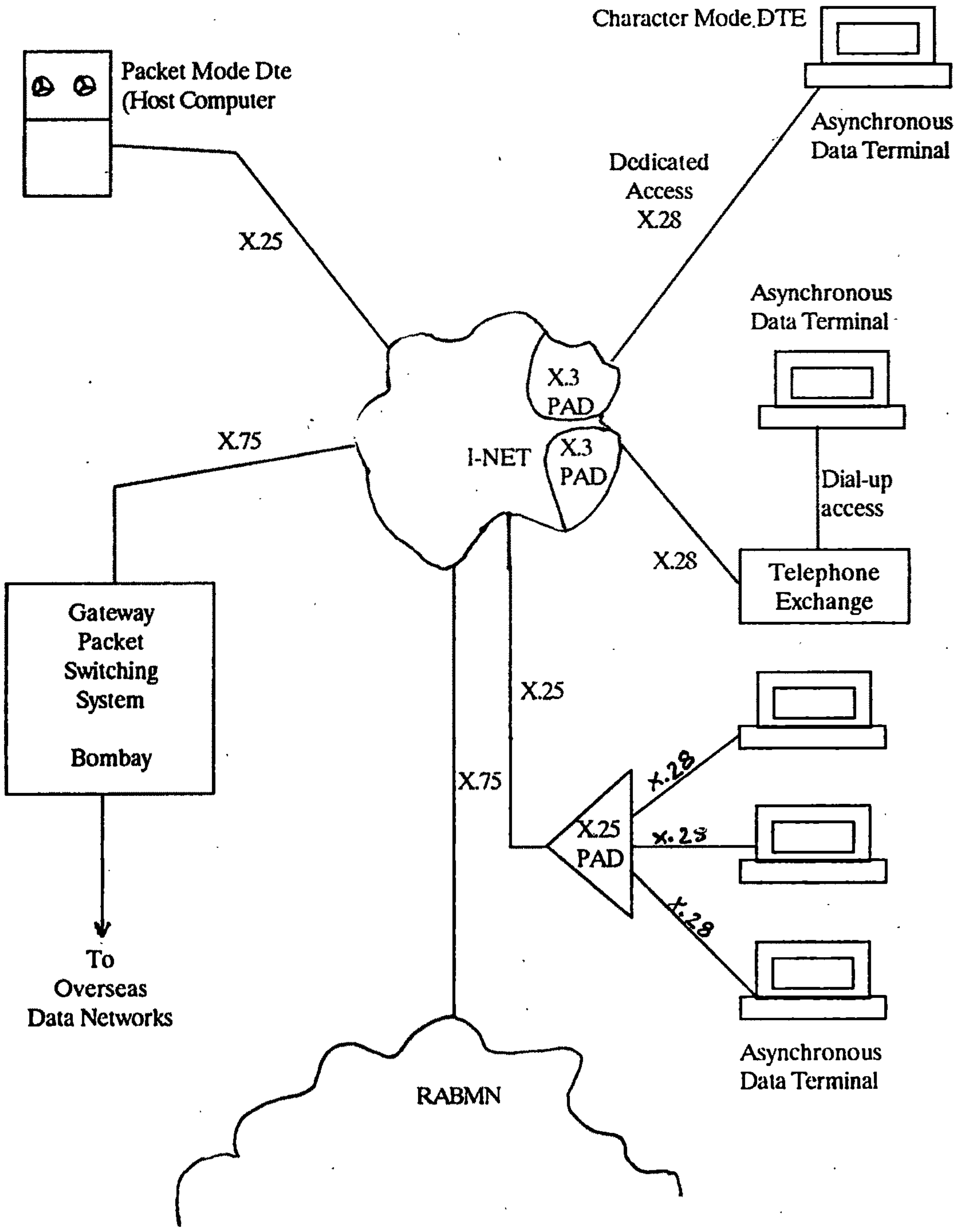

Character Mode DTE
Packet Mode Dte
(Host Computer
Asynchronous
Data Terminal
Dedicated
Access
X.28
X.25
Asynchronous
Data Terminal
X.3
PAD
X.75
I-NET
X.3
PAD
Dial-up
access
X.28
Telephone
Exchange
Gateway
Packet
Switching
System
Bombay
X.25
X.75
X.28
X.25
PAD
X.28
X.28
To
Overseas
Data Networks
RABMN
Asynchronous
Data Terminal

Fig. 8

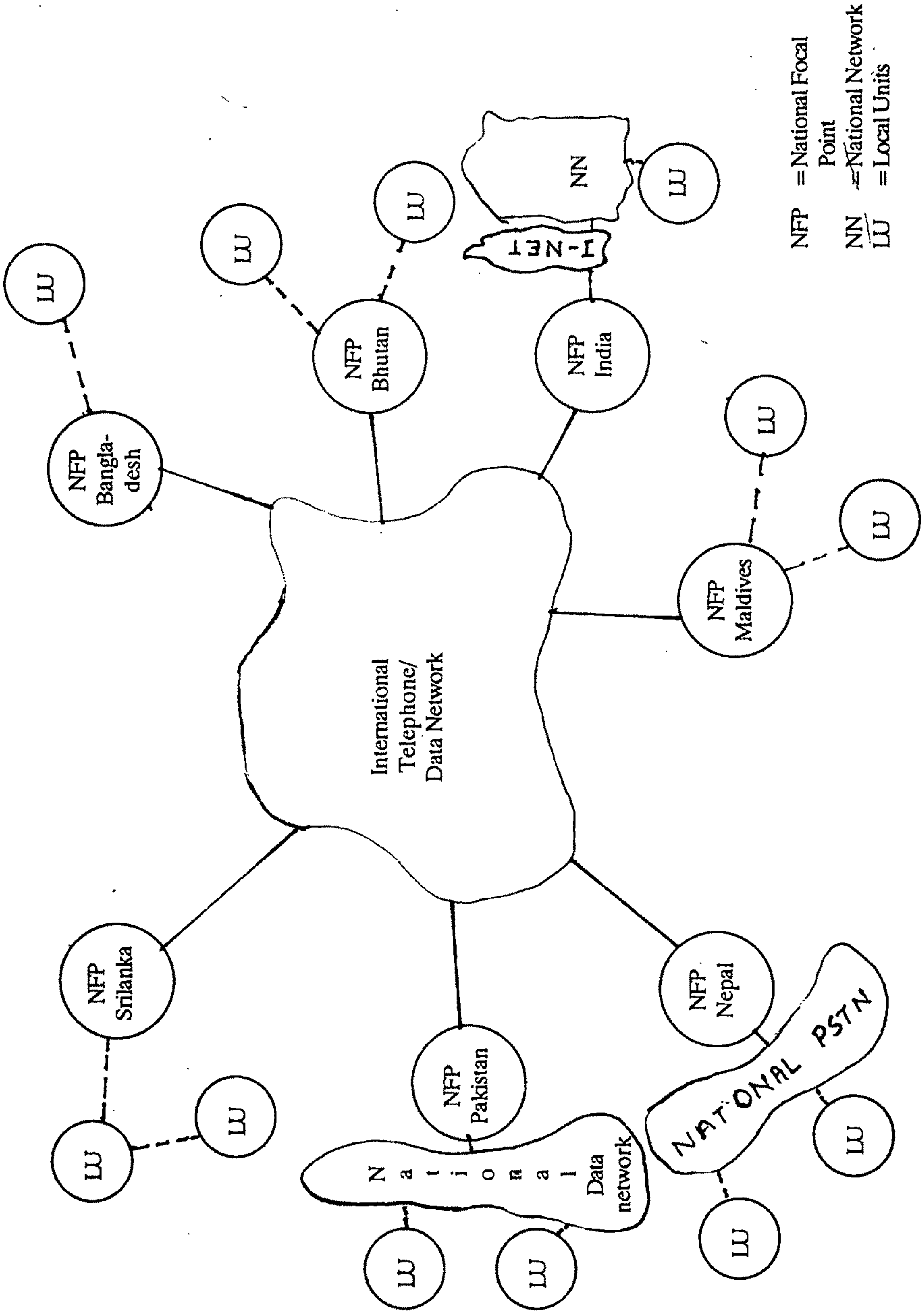


Fig. 9 : SAARC Information Network

information resources available in the SAARC countries.

A proposed configuration for SAARC Information Network is shown in Fig 9. National Focal Points (NFPs) will be connected using the International Public Switched Telephone or Data Network facilities. Gateway Packet Switching System (GPSS) of VSNL could be used as a reliable, cost-effective and flexible means of transborder data transfer. Initially electronic mail facility can be introduced. As and when the National Focal Points (NFPs) develop the appropriate infrastructurel, other services may be introduced. It is imperative that each National Focal Point in the SAARC System should have the telecommunication facilities of a common agreed standard to facilitate interaction directly with each other for exchange of information.

INSDOC has compiled a database of the National Union Catalogue of Scientific Serials in India recording 35,000 serial titles held in over 800 libraries in India. Many of the SAARC countries may have similar Union Catalogues. All these could be updated and merged into a single file and shared over the network. Another area in which SAARC countries could cooperate is the creation of commonly usable databases which could be specific mission or discipline oriented. The databases created by SAARC will not only satisfy the requirements of the SAARC region but can also be commercially exploited by information seekers from other parts of the world.

Since computers are now being extensively used in all the developing countries to automate the library services and functions it is suggested that the mode of retrospective conversion of bibliographic records may also be worked out to make the entire data available on network.

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Annals of Library Science and Documentation 1991, 38(2), 53-68

DESIGN AND DEVELOPMENT OF A DATABASE ON MICRO-CDS/ISIS-UNION CATALOGUE OF S & T CONFERENCE PROCEEDINGS

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Though rich collections of conference proceedings are available in Indian S & T institutions, no retrieval tool/union catalogue is available to provide access to them at regional/national level. INSDOC took up a project of creating a database of S & T conference proceedings and publishing a union catalogue of the same. INSDOC Regional Centre, Bangalore was entrusted with the job of covering the S & T libraries in Bangalore. This paper describes their experiences of developing the database on Micro-CDS/ISIS and publishing the first volume of the union catalogue using DTP system.

INTRODUCTION

Conference proceedings is one of the important primary sources of information. A number of conferences are held in various areas of Science and Technology (S & T) almost daily throughout the world. Very recent findings and research results are reported usually in conferences. The term 'Proceedings' is used to denote proceedings of the conferences held regularly or irregularly including seminars, symposia, meetings, congresses, conventions, workshops, etc. Proceedings issued by the learned bodies in the form of regular journals like "Proceedings of the Indian National Science Academy", etc. are not taken into consideration. Though S & T libraries in the country are having a good collection of these proceedings, lack of retrieval tool/catalogue at the city/regional/national level impedes access to these publications. Realising the urgent need and importance of having bibliographical control over these publications, INSDOC took up a project in the later part of 1989 for the compilation of union catalogue of conference proceedings available in major S & T libraries in India. As the first phase of this project, S & T institutions in Bangalore were selected and the job was entrusted to INSDOC Regional Centre, Bangalore. Thirty S & T institutions in different disciplines in Bangalore were chosen to be covered in this phase (Appendix I). A bibliographic database of S & T conference proceedings available in these libraries from 1977-90 is developed at this centre and a union catalogue is published in January 1991.

DATA COLLECTION

Data was collected by trained personnel mainly from the card catalogues of the participating libraries and from the published proceedings of conferences. Data elements were selected keeping in view the output requirements and the needs of the end users. Since there is no uniformity in cataloguing practices followed by these libraries, a number of problems were faced while rendering the data. While some libraries adhered to very rich cataloguing practice the data provided by some other libraries in their card catalogues was insufficient for the purposes of compilation of the present catalogue. In such cases additional data was procured as per the requirements as far as possible.

Over 7200 records were collected for including in the database and each one was indexed carefully to facilitate retrieval - which is the very purpose of building the database. It took about six months to collect the data and five months to process and print the final product.

DATABASE DEVELOPMENT

Following hardware was used for the database development and desk-top publishing.

a) DCM PS/386 with 86 MB HD with DOS and UNIX partition and

b) PCL PS/386 with 80 MB HD.

Unesco's CDS/ISIS mini-micro version 2.3 was chosen for the creation and maintenance of the UCCP (Union Catalogue of Conference Proceedings) database. It is a Generalized Information Storage and Retrieval System designed specifically for the computerized management of structured non-numerical databases. This package can run on any IBM compatible PC XT/AT under MS-DOS operating system. The features of CDS/ISIS which influenced the choice of the software are [1]:

a) CDS/ISIS allows to define database containing required data elements,

b) It is designed to handle fields and records of varying length, including the repeatable fields,

c) It prints partial or full catalogues and /or indexes from a given database in a desired format,

d) It automatically builds and maintains fast access files to the database and

e) It retrieves records by their contents, through a sophisticated search language.

This software is more popular in Indian Library and Information (L & I) centres and it is being used for creating bibliographical databases and information storage and retrieval activities. A survey conducted in November 1989 to find out the usage of Micro-CDS/ISIS for L & I activities in India shows that Micro-CDS/ISIS is used more (68.18%) than any other software for computer based information storage and retrieval services [2]. CDS/ISIS provides data exchange facilities which can be used to accept and produce sequential data files in the ISO-2709 standard format. This option allows moving data from one database management system into another. An advanced programming facility using the Pascal language enables further manipulation of the CDS/ISIS files and databases.

Keeping in view all the above features of CDS/ISIS and its popularity in Indian L & I centres, it was decided to use this software for creating the database.

Database Definition

CDS/ISIS requires the database structure to be specified in a Field Definition Table (FDT). The FDT defines the fields and subfields which may be present in the records of the database and their characteristics. Fifteen fields were defined for the present database, out of which 4 fields were made repeatable and six fields had a provision of a number of sub-fields (Appendix VIII). Data input sheet and instruction sheet were designed and prepared for data compilation and data entry. (Appendix II & III).

The fields were defined according to the standards recommended in Unesco's Common Communication Format (CCF) [3]. The CCF is designed to provide a standard format for three major purposes:

a) To permit the exchange of bibliographic records between groups of libraries and abstracting and indexing services.

b) To permit a bibliographic agency to use a single set of computer programs to manipulate bibliographic records received from both libraries and abstracting and indexing services.

c) To serve as the basis of a format for an agency's own bibliographic database, by providing a list of useful data elements.

The CCF is independent of any cataloguing rules and gives freedom to fulfil the local requirements. Since tags are not defined in CCF for some of the data elements which are specific to the present needs, non-CCF tags were also used.

Data Entry

The PC (DCM PS/386) used for data input is a mail node of SIRNET (Scientific and Industrial Research Network), INSDOC's E-mail facility. Since the machine had to be kept in Unix environment during the working hours, data entry could not be made in CDS/ISIS. To get over this problem data was entered in text files using the 'vi' editor on Unix system, and these files were copied to DOS environment. A program was developed in CDS/ISIS Pascal to load the records in batches from these text files into CDS/ISIS database [4]. Besides, data entry was done on another PC (PCL PS/386) using Wordstar and the data was loaded in the same manner onto CDS/ISIS.

Data Management and Printing

To check for the duplicate records in the database another piece of CDS/ISIS Pascal code was developed, which prints out the duplicate records along with their Master File Number (MFN) which is assigned by CDS/ISIS. These print-outs were checked manually and the database records edited accordingly using CDS/ISIS editing facilities. Finally for making the database searchable, inverted file was created by giving the specifications in the Field Select Table (FST). With the help of this file, records could be retrieved from the UCCP database, using keywords, subject headings, sponsors, venue data and library symbols as the access points.

It was decided that the entries in the catalogue should be classified according to UDC and the union catalogue should be printed as an alphabetical listing of conference proceedings under the subject headings taken from UDC, along with the places of their availability (institution's name/library symbol). A broad but fairly specific subject heading was assigned as in the case of Indian Science Abstracts [5] to all the records of the database while indexing them. Under each subject heading entries are arranged alphabetically by the title of the publication and then chronologically by the date of the conference held. The title of the publication is given as first entry element rather than the name of the meeting/conference since the title is more expressive from the user's view-point, and the entries are serially numbered (Appendix IV). Following indexes (Appendix V, VI & VII) are provided which refer to the main part of the catalogue by the serial number.

a) Sponsor Index

b) Subject Headings under Sponsors Index, and

c) Keyword Index

Subject Headings under Sponsors Index is provided in order to help the end user to find out the subjects of the conferences held under the sponsorship of a particular sponsor. Keyword (s) are selected mainly from the title of the publication/conference to locate/identify a particular conference publication.

CDS/ISIS uses the MFN, a serial number assigned by the system to each record at the time of input, as a short reference in the index. But, the main part is classified, i.e. it is sorted on the subject headings and the records are not printed in the same order as they exist in the database, which makes the index meaningless. Hence, the database is sorted first on subject headings and exported in ISO 2709 format. Then these records are imported into another database (with the same structure) in the sorted sequence and new MFNs are automatically asigned to the records in the database. When the main part is printed from this database the new MFN is used as an index number. Necessary print formats and sort work sheets are designed for the purpose.

After processing the data in CDS/ISIS, layout has been done using Ventura software and printed using HP Laser Jet Printer. Copies of the Union Catalogue were offset printed from these pages. Only the essential information, mainly required for an end user to identify and locate a particular conference publication, is included in the catalogue. However, other information collected from the card catalogues such as ISBN, note, series statement, UDC numbers, etc. are kept in the database. Each entry in the catalogue contains:

a) Title of the publication,

b) Names of the meeting/ conference, venue, and year of the conference held,

Table 1
Country-Wise Breakdown of Conference Proceedings

Ranking	Country	Total No. of Proceedings	Percentage
1.	U.S.A	2736	37.9
2.	U.K.	853	11.84
3.	India	839	11.65
4.	Germany (East & West)	407	5.65
5.	France	347	4.8
6.	Italy	324	4.5
7.	Netherlands	164	2.30
8.	Japan	162	2.25
9.	Canada	156	2.18
10.	Switzerland	99	1.38
11.	Australia	88	1.22
12.	Belgium	73	1.02
13.	Austria	54	0.79
14.	Hungary	44	0.61
15.	Greece	42	0.59
16.	Spain	41	0.58
17.	Poland	40	0.55
18.	U.S.S.R.	38	0.52
19.	China	30	0.42
20.	Mexico	30	0.42
21.	Denmark	28	0.40
22.	Philippines	27	0.39
23.	Israel	25	0.35
24.	Singapore	23	0.32
	Others	531	7.37

Table 2
Subject-wise Breakdown of Conference Proceedings

Ranking	Subject	Total No. of Proceedings	Percentage
1.	Engineering	2042	28.36
2.	Manufactures. Different types of industries	951	13.21
3.	Physics	790	10.97
4.	Mathematics	650	9.01
5.	Agriculture. Forestry. Animal Husbandry. Fisheries	625	8.68
6.	Medical Science	407	5.65
7.	Astronomy. Astrophysics. Space Research	404	5.61
8.	Chemical Engineering & Chemical Technology	313	4.35
9.	Biological Sciences	275	3.82
10.	Chemistry	166	2.31
11.	Library & Information Science	129	1.79
12.	Geology. Meteorology. Hydrology	125	1.74
13.	Management	103	1.43
14.	Botany	54	0.75
15.	Zoology	45	0.62
16.	Architecture & Building Industries	28	0.39
17.	Home Science	11	0.15
18.	Palaeontology. Fossils	9	0.13
	Others	74	1.03

Table 3

Institution-wise Breakdown of Conference Proceedings

Name of the Institution		No. of Proceedings held	Name of the Institution		No. of the Proceeding held
IISc	...	2020	UAS	...	106
NAL	...	1201	CMTI	...	104
RRI	...	349	ISI	...	98
ISAC	...	344	BEL	...	54
GKVK	...	331	NDRI	...	51
TIFR	...	329	NIMHANS	...	45
IIAP	...	320	MECON	...	38
LRDE	...	319	IPIRI	...	35
ADE	...	244	ADA	...	34
KECL	...	236	BU	...	33
IIHR	...	201	NTI	...	27
IIM	...	193	HMTM	...	25
CPRI	...	190	HMTR	...	17
SJMCH	...	122	VITM	...	12
GTRE	...	115	IWST	...	8

c) Sponsoring body with place,

d) Place of publication,

e) Name of the publisher,

f) Year of the publication,

g) Number of pages,

h) Library symbol/institution name and

i) Call number given by the holding library.

To facilitate the location of the publication, its call number, wherever available, assigned by the holding library is indicated against the abbreviated name of the institution/library. A sample entry is given in Appendix IX.

ANALYSIS OF THE DATA

The statistics generated from the database using a Pascal interface program is given in Tables 1, 2 & 3. This database contains bibliographical references of 7201 conference proceedings available in 30 S & T libraries in Bangalore. These proceedings pertain to the conferences held during the period 1977-90 all over the world. Country-wise breakdown of the conference proceedings shows that 2736 (37.9%) out of 7201 conferences were held in USA followed by UK 853 (11.84%), India 839 (11.65%), etc. Subject-wise breakdown shows that about 2042 (28.36%) proceedings belong to engineering followed by manufactures of different types of industries 951 (13.21%). The library of Indian Institute of Science has a major part of the collection by holding 2020 proceedings followed by the National Aeronautical Laboratory with a holding of 1201 proceedings.

CONCLUSION

CDS/ISIS is being used in a number of L & I centres in India mainly for creating in-house bibliographic databases. Advanced facilities/techniques available in Micro-CDS/ISIS, Unix, Word Star and Ventura are used here probably for the first time in India to create a large database and produce a union catalogue with several indexes in high quality printing. Efforts are being made to make this catalogue available on online as a part of the online services planned by INSDOC. This catalogue will be a useful tool for scientists and librarians in India to locate the conference proceedings. The hardcopy of this publication is now available for sale from all the INSDOC centres.

ACKNOWLEDGEMENTS

The authors are grateful to Prof. T Viswanathan, Director of INSDOC for sanctioning this project and his kind permission to publish this paper. They are also thankful to Shri. K. Kannan, Officer-in Charge, INSDOC Regional Centre, Bangalore for his encouragement in completing this task. Thanks are also due to Shri A. Srinivasa Ravi of the National Centre for Science Information, Indian Institute of Science for his valuable suggestions throughout this project and to Shri B. Sadananda Rao of INSDOC, for his kind help and encouragement.

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3. UNESCO: CCF - Common Communication Format. 2nd ed. Paris, Unesco, 1988, 196p.

4. Srinivasa R A, Hariharan A and Sadananda Rao B: How to bring out a union catalogue using CDS/ISIS and Ventura - Some Tips (To be published).

5. INSDOC: Indian Science Abstracts - Subject headings (Unpublished).

APPENDIX I

List of S & T Institutions Covered in the Catalogue

1. Aeronautical Development Agency (ADA)
2. Aeronautical Development Establishment (ADE)
3. Bangalore University (BU)
4. Bharat Electronics Ltd. (BEL)
5. Central Machine Tool Institute (CMTI)
6. Central Power Research Institute (CPRI)
7. Electronics and Radar Development Establishment (LRDE)
8. Gandhi Krishi Vignana Kendra (GKVK)
9. Gas Turbine Research Establishment (GTRE)
10. Hindustan Machine Tools (Metal Cutting Informatiion, R & D Centre) (HMTM)
11. Hindustan Machine Tools (R & D Centre) (HMTR)
12. Indian Institute of Astrophysics (IIAP)
13. Indian Institute of Horticultural Research (IIHR)
14. Indian Institute of Management (IIM)
15. Indian Institute of Science (IISC)
16. Indian Plywood Industries Research Institute (IPIRI)
17. Indian Space Research Organisation, Satellite Centre (ISRO)
18. Indian Statistical Institute (ISI)
19. Institute of Wood Science & Technology (IWST)
20. Kirloskar Electric Co. Ltd. (KECL)
21. Metallurgical Engineering Consultants (India) Ltd. (MECON)
22. National Aeronautical Laboratory (NAL)
23. National Dairy Research Institute (NDRI)
24. National Institute of Mental Health and Neurosciences (NIMHANS)
25. National Tuberculosis Institute (NTI)
26. Raman Research Institute (RRI)
27. St. Johns Medical College and Hospital (SJMCH)
28. Tata Institute of Fundamental Research (TIFR)
29. University of Agricultural Sciences (UAS)
30. Visveswaraya Industrial & Technological Museum (VITM)

APPENDIX II

INSDOC REGIONAL CENTRE, BANGALORE

Union Catalogue Data Base of Scientific & Technical Conference Proceedings

Data Input Worksheet

Data Element	Tag	Subfields	Data
Source	20		
Language	40		
ISBN	100		
Title	200		
Editors	300	^a^b	
Sponsors	310	^a^d	
Name of the meeting	320	^a^e^g^h^i^j	
Place of Publication and Publisher	400	^a^b	
Year of the Publication	440		
No. of Pages	460		
Series statement	480	^a^b^c	
Note	500		
Subject heading	619		
Library symbol	610	^1^a^b	
Keywords	620		

Date: Prepared by: Checked by: Keyed-in by:

APPENDIX III

INSDOC REGIONAL CENTRE, BANGALORE

Instructions for Data Input for UCCP Database

Tag	Data Element	Subfield	Data Element Description
20	Source		INSDOC for all records.
40	Language		Language of the document in coded form.
100	ISBN		ISBN of document
200	Title		Title of document
300	Editors	^a^b	^a Surname, ^b Forename
310	Sponsor	^a^d	Names of the sponsoring bodyies upto the maximum of two. ^a Name of sponsoring body ^d Place
320	Name of the meeting	^a^e^g^h^i^j	^a Name of the meeting ^e Name of the country ^g Venue ^h Date (ISO form) ^i Date (free form) ^j Number of the meeting
400	Place of publication		Name of the place
440	Year of publication		Year of the publication of document
460	Page		No. of pages/volume
480	Series statement	^a^b^c	^a Name of the series ^b statement of responsibility ^c Number of the series
500	Note		1. Number of papers presented in the conference, number of volumes, etc. 2. Information about the document if it is issued as a report, a mono-graph, etc.
619	Subject Heading		Main subject of the document.
620	Keywords		Specific keywords/descriptors.
610	Library/Notation	^l^a^b	^l Name of the library. ^a Call number ^b UDC Number.

APPENDIX IV

CONFERENCE PROCEEDINGS

ACCIDENTS SAFETY

0001 ENGINEERING FOR PROTECTION FROM NATURAL DISASTERS: Int Conf Proc. Bangkok, 7-9, Jan 1980. Asian Institute of Technology; Canadian International Development Agency; Southeast Asian Society of Soil Engineering (Bangkok, AIT, 1980, 937p)

CPRI	624.131.55.1.1
ISAC	614.8(063) N80
IISc	620.86 N80

0002 RADIATION PROTECTION: A SYSTEMATIC APPROACH TO SAFETY: 5th Cong. Jerusalem, Mar 1980. International Radiation Protection Society (Oxford, IRPS, 1980, 603p)

ISAC	614.898 (063) N80.1

0003 STANDING COMMITTEE ON SAFETY FOR THE STEEL INDUSTRY: Sem Proc. Bokaro, 10-11 Sep 1986. (India, 1986)

MECON

0004 TRANSPORT OF HAZARDOUS MATERIALS: Symp. London, 15 Apr 1977. Institution of Civil Engineers. London. (London, ICE, 1978, 154p)

ISAC	614.8;629.1(082.2) N78

ACOUSTICS. VIBRATIONS

0005 ACOUSTIC AND VIBRATIONAL COMMUNICATION IN INSECTS: 27 th International Cong Proc. Hamburg, Aug 1984. German Society for General and Applied Entomology - Kiel. (Hamburg, Veryag Paul Parey, 1985, 230P)

GKVK	595.705 906 KAL

0006 ACOUSTIC EMISSION FROM REINFORCED COMPOSITES: Ist Int Symp. San Francisco, 19-21 Jul 1983. Society of Plastics Industry - New York. (New York, Soc of Plastics Industry, 1983)

NAL	FX,33"p N83

0007 ACOUSTIC EMISSION MONITORING AND ANALYSIS IN MANUFACTURING. New Orleans, 9-14 Dec 1984. American Society of Mechanical Engineers - New York. (New York, ASME, 1984)

NAL	FX,1;FR;7"pN84

0008 ACOUSTIC EMISSION: Sem. Madras, 1 Oct 1983. Association of Indian Engineering Industry - Madras. (Madras, Assoc of Indian Engg Industry, Southern Region, 1983)

KECL	620.111.3(063) AIE

APPENDIX V

SPONSOR INDEX

Abhandlungen der Akademie der Wissenschafftern der DDR 5786

Academia Sinica 2183, 6644

Academy of Science Research and Technology 4290

ACIF 4015

Acoustic Speech and Signal Proceesing Society 1909

Acoustical Society of America 3367

Acoustical Society of India 0009, 0010

Acrow India Ltd 1285

Advisory Group for Aerospace Research and Development 5069

Advanced in the Astronautical Science 0796

Advanced School of Astronomy of the "Ettore Majorana" 6641

Advanced School of Astronomy of the Ettore Majorana Centre for Science Culture 6648

Advisory Group for Aerospace Research and Development 0072, 0085, 0086, 0105, 0109, 0115, 0117, 0126, 0129, 0130, 0205, 0206, 0230, 0249, 0263, 0284, 0285, 0291, 0299, 0348, 0606, 0833, 0840, 1085, 1633, 2364, 2707, 2928, 4375, 4391, 4459, 4461, 4955, 5011, 5036, 5040, 5047, 5060, 5067, 5485, 6871

Aeronautical Research and Development Board 0262, 4789

Aeronautical Research Institute of Sweden 1799

Aeronautical Society of India 0074, 0075, 0076

Aerospace and Electronic Systems Society 0146, 0311, 0313, 6276, 6277, 6281, 6832

Aerospace Group for Advance Research and Development 0072, 5485

AES 0214, 3180

Afdeling Mechanische Produkte en Konstruktie 0030

AFGL 4526

AFIPS 2086

Africa-Council for Scientific and Industrial Research 4414

APPENDIX VI

SUBJECT HEADINGS UNDER SPONSORS

Abhandlungen der Akademie der Wissenschafftern der DDR
    Plant Morphology 5786

Academia Sinica
    Data Processing Machines. Computers 2183
    Stars. Stellar System. Universe 6644

Academy of Science Research and Technology
    Industrial Sanitation 4290

ACIF
    Gravitation. Ballistics 4015

Acoustic Speech and Signal Processing Society
    Cybernetics 1909

Acoustical Society of America
    Electronics 3367

Acoustical Society of India
    Acoustics. Vibrations 0009, 0010

Acrow India Ltd
    Building 1285

Advanced School of Astronomy of the Ettore Majorana Centre for Science Culture
    Stars. Stellar System. Universe 6641, 6648

Advisory Group for Aerospace Research and Development
    Aerodynamics 0072, 0085, 0086, 0105, 0109, 0117, 0118
    Aeronautical Engineering 0126, 0129, 0130, 0205, 0206, 0230, 0249,0263, 0284, 0285, 0291, 0299, 0348
    Astronautics 0833, 0840
    Automatic Control Engineering 1085
    Computational Machematics. Computer Programming 1633
    Data Processing Machines. Computers 2364, 2707
    Electric Machines/Generators/Motors 2928
    Internal Combustion Engines 4375, 4391
    Locomotives. Rolling Stock 4459
    Locomotory Organs. Diseases 4461
    Metallurgy 4955
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Absorption lines 6633
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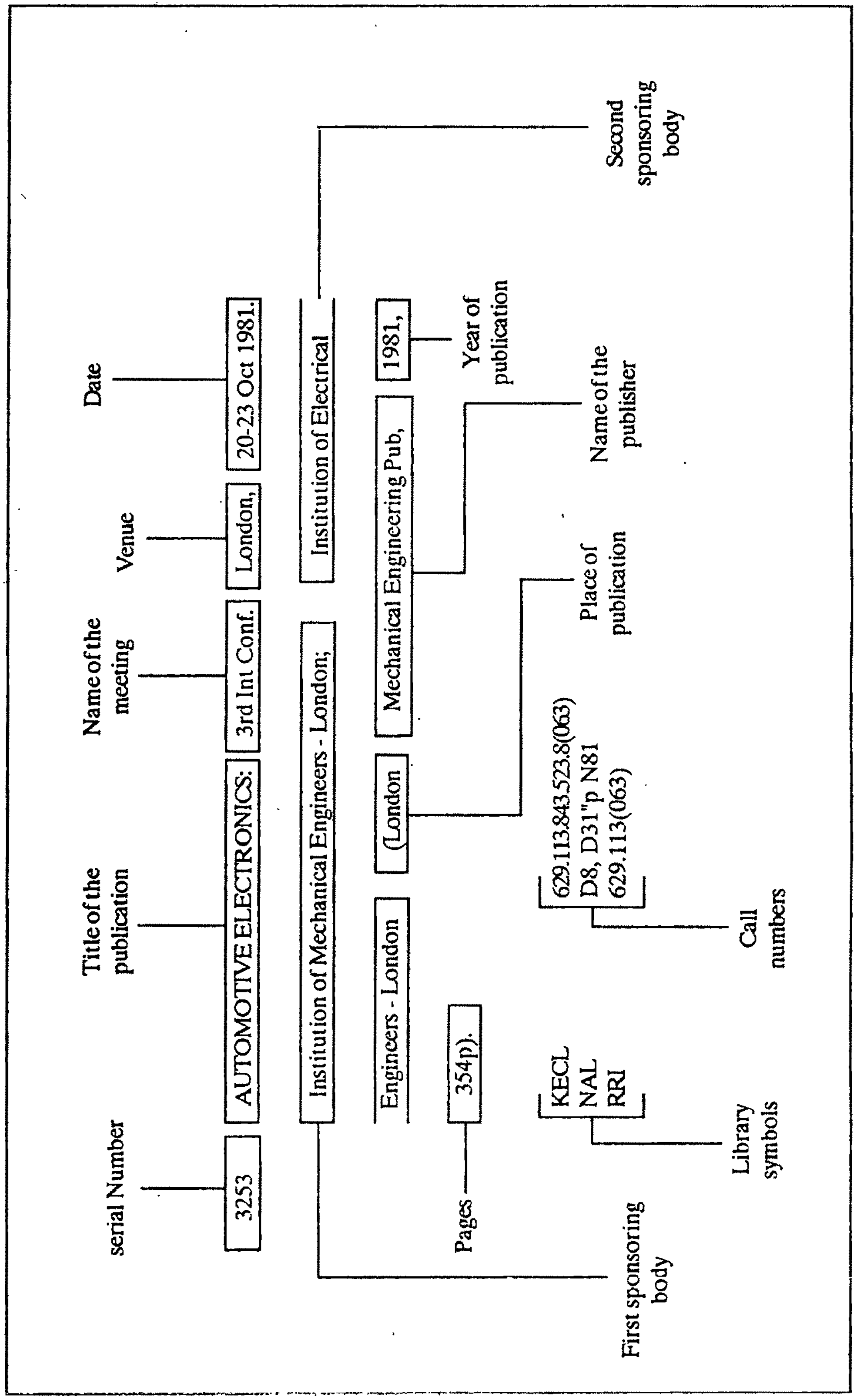
Field Definition Table (FDT) Data Base: UCCP

Tag	Name	Len	Typ	Rep	Delimiters/Pattern
- 20	Source	6	X		
- 40	Language	3	X		
- 100	ISBN	20	X		
- 200	Title	400	X		
- 300	Editors	150	X	R	ab
- 310	Sponsors	400	X	R	ad
- 320	Name of the Meeting	300	X	R	aeghij
- 400	Place of Publication & Publisher	200	X		ab
- 440	Year of the Publication	8	X		
- 460	Page	10	X		
- 480	Series Statement	200	X		abc
- 500	Note	150	X		
- 619	Subject Heading	75	X		
- 620	Keywords	700	X		
- 610	Library/Notation	400	X	R	lab

APPENDIX IX


Sample Entry
serial Number
Title of the publication
Name of the meeting
Venue
Date
3253
AUTOMOTIVE ELECTRONICS:
3rd Int Conf.
London,
20-23 Oct 1981.
Institution of Mechanical Engineers - London;
Institution of Electrical
Engineers - London
(London
Mechanical Engineering Pub,
1981,
354p).
Pages
First sponsoring body
Second sponsoring body
Place of publication
Name of the publisher
Year of publication
KECL
NAL
RRI
629.113.843.523.8(063)
D8, D31"p N81
629.113(063)
Library symbols
Call numbers

Annals of Library Science and Documentation 1991, 38(2), 69-73

USE OF CAB INTERNATIONAL ABSTRACTING PERIODICALS IN MAHATMA PHULE AGRICULTURAL UNIVERSITY LIBRARY, RAHURI - A SURVEY

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The study aims at reviewing the use of CAB International (CABI) abstracting periodicals that are subscribed by the library of Mahatma Phule Agricultural Univeristy (MPAU), Rahuri (Maharashtra State). The study is conducted with the help of a written questionnaire supplemented by personal interviews wherever possible. 140 teaching, research and extension staff members and 75 M.Sc. and Ph.D. students selected randomly were the respondents to the study.

INTRODUCTION

Tremendous growth of literature and the escalating prices of the periodicals have made it imperative on the part of the library management to monitor their use so that only those periodicals are subscribed which are found to be essential. Such studies help in proper utilization of funds. They also enable the management to know the exact requirements of the users and to take necessary steps to meet them.

The university library, MPAU, Rahuri subscribes to 47 abstracting periodicals published by the Commonwealth Agricultural Bureau International,UK, which cover almost all the subjects taught in the university. It was decided to conduct a study to ascertain the extent of their use, adequacy in meeting the needs of users, convenient display arrangement and other related problems. Readers were also invited to give their suggestions to effect improvement in the present situation of periodical section, wherever required.

METHODOLOGY

Busha and Harter [1] suggested survey methods for obtaining data in the following classes.

a) Information about incidents and developments, i.e. data about events in a given period,

b) Information about the distributions and frequencies, i.e. the data concerning the possessions or characteristics of each member of a subject group,

c) Information about the generally known rules and status, i.e. data about institutional norms and conditions.

Since the study comes under the class "Information about distributions and frequencies", the survey method was chosen. To collect the relevant data through the survey, a written questionnaire technique supplemented by personal interviews was used. As pointed out by Werner Kunz and others [2], the advantages of questionnaires derive mainly from the fact that a relatively large group of persons can be surveyed in relatively shorter period of time. Moreover, if the desired sample of the total population to be surveyed is large, this procedure offers a considerable economic advantage as compared to the other data collection techniques.

Questionnaire designed for this study was distributed to all teachers, research and extesion staff members selected upto the level of junior research assistants, post graduate students and Ph.D. scholars in all disciplines at the Central Campus, Rahuri. In all 250 questionnaires were distributed, out of which 215 were responded by 140 staff members and 75 students. Since the number of readers of these categories was large it was decided to select the respondents randomly.

The data so collected was analysed from different angles to derive the required information. The findings made after the data analysis are presented below. The suggestions given by the users to improve the present situation of the periodical section of the university library have also been enumerated.

USE OF PERIODICALS

The users are found to visit the periodical section for different purposes. A majority of teachers (59.29%) visit the periodical section for collecting references for their lectures, whereas majority of students (81.33%) visit for conducting literature search on specific topics. About 49% teacher-respondents visit the periodical section for searching specific piece of information whereas only 24% students visit the periodical section for this purpose. It was found that 40.71% teacher-respondents and 37.33% students visit the periodical section for browsing through current periodicals.

Only 47.14% teachers visit the Periodical Section for the purpose of writing an article/book and 28.75% of them visit it for verifying the works of Ph.D. and postgraduate students.

ARRANGEMENT IN PERIODICAL SECTION

A majority of teacher and student respondents (84.28% and 73.34%) are found to be in favour of the present arrangement of current periodicals i.e. alphabetical arrangement within each subject. Only 9.29% teachers and 13.33% students wanted alphabetical arrangement of all Periodicals irrespective of subject whereas 5.72% teachers and 13.33% students desired the arrangement according to class numbers.

A large number of teacher and student respondents (92.14% and 76%) were in favour of present arrangement of back volumes (alphabetical within subjects). About 6% teachers and 15% students suggested the arrangement according to class number whereas 2.14% teachers and 9.33% students felt that back volumes of journals should be arranged alphabetically irrespective of subjects.

66.43% of teacher-respondents and 81.33% of student-respondents expressed the desire that current periodicals and bound volumes should be arranged at one place in periodical section. Only 29.29% teachers and 18.67% students were in favour of arranging loose issues of all the periodicals at a place different from that of back volumes.

USE OF CATALOGUE OF PERIODICALS

About 50% of teacher-respondents and 49.33% of student-respondents are observed to go directly to the shelves without consulting library catalogue. It is consulted by only 38.57% of teachers and 36% of students.

USE OF CAB INTERNATIONAL ABSTRACTING PERIODICALS

About 63% of teacher-respondents and 61.33% student-respondents are observed to be referring to CAB International abstracting journals, because they can get various references at one place. A large number of respondents reported that they are referring to them because the CAB International Database covers over 10,000 important international journals in their field and approximately 1,30,000 bibliographic records are added to the database every year.

The Tables 1 and 2 below show the degree of use of CAB International abstracting periodicals staff members and the students respectively.

Table 1
Use of Periodicals by Staff Members

Sl. No.	Category of back volumes	Percentage of staff members		
		Used frequently	Used ocassionally	Used rarely
1.	Journals published before 1970	15.71	19.29	57.14
2.	Journals published during 1971-75	10.00	39.28	42.86
3.	Journals published during 1976-80	23.57	51.43	17.14
4.	Journals published during 1981-85	60.00	26.43	5.71
5.	Journals published during and after 1986	70.00	15.71	6.43

Table 2
Use of Periodicals by students

Sl. No.	Category of back volumes	Percentage of students		
		Used frequently	Used ocassionally	Used rarely
1.	Journals published before 1970	6.67	8.00	85.33
2.	Journals published during 1971-75	8.00	69.33	22.67
3.	Journals published during 1976-80	46.67	49.33	4.00
4.	Journal published during 1981-85	89.33	10.67	-
5.	Journals published during and after 1986	66.67	29.33	4.00

ADEQUACY OF CAB INTERNATIONAL PERIODICALS

The number of CAB International abstracting periodicals subscribed at present is found adequate to meet the needs of the users Hence there is no immediate need to add other abstracting perioidicals. The data reveals that the immediate needs of 96.43% of teacher-respondents and 98% of student respondents are satisfied with the present collection.

A significant number of teacher-respondents (80.71%) and 69.33% of student-respondents felt that the present collection is adequate enough to meet their requirements. However, 19.29% teachers and 28% students suggested some new CAB International abstracting journals which may be added to the collection of the library.

All respondents are found in favour of continuing the presently subscribed CAB International abstracting journals.

SELECTION OF PERIODICALS

A significantly large number of teacher-respondents i.e. 80.71% and 36% of students are found in favour of the present system of routing suggestions for addition of periodicals through the heads of the departments.

It is also suggested by the respondents that in order to fulfil the needs of all categories of readers, the teachers and the research staff should also be consulted for selection of journals.

The students may also give suggestions to their teachers or the heads of the departments for selecting/deleting a periodical.

STORAGE OF PERIODICALS

Use of compact storage devices and microforming of the documents are suggested to overcome the space problem which the university library is likely to face in near future.

It is suggested that the periodicals published before 1970 may be preserved in a compact storage device as only 15.71% of teacher-respondents and 6.67% of student-respondents need them frequently. About 19% teachers and 8% students use them occasionally and 57.14% of teacher-respondents and 85.33% of student-respondents need them scarcely.

The problem of space may be solved to some extent by arranging back volumes of journals on only one floor of the library building.

PROBLEMS OF USERS

Major problems faced by the users while using the current periodicals are :

a) Late receipt of periodicals in the library,

b) Misplacement of loose issues of periodicals,

c) Non-availability of periodicals in the library,

d) Non-availability of journals on inter-library loan, and

e) Incomplete volumes.

Following measures are suggested to make the journals available to readers:

a) Airlifting of periodicals should be encouaged to reduce procurement time,

b) Subscription should be renewed in time (October /November each year) for which finances should be made available to the library in time,

c) The period of claim for non-receipt of periodicals be extended by the foreign publishers to six months in case of Indian libraries,

d) Users cooperation is solicited for avoiding misplacement of the issues and

e) Exchange programme of duplicate issues among university library and other research libraries is desirable for filling the gaps in holdings of the libraries, etc.

Problems faced by the users while using the back volumes are observed as follows :

a) Not bound in time,

b) Sent for binding,

c) Wrong shelving, and

d) Not replaced in time.

To overcome these problems, it is suggested that the Mahatma Phule Agricultural University Library should have its own bindery unit, adequate finances be provided for binding of back volumes and necessary staff be provided to ensure that the back volumes are replaced back in their places expeditiously.

CURRENT AWARENESS SERVICE

It is observed that about 58% respondents want information about current articles of interest to them and about 35% respondents have suggested for Tropical Bibliographical Service. It is also observed that about 5% of respondents have shown their disinterestedness in the Selective Dissemina tion of Information Service and only 1% have not given their views on this point.

USER INSTRUCTION PROGRAMME

At present a user instruction programme is being implemented in the university library, MPAU, Rahuri under which the users are made aware of the CAB International abstracting journals and the techniques of using them. The data collected in this regard reveals that about 78% of respondents are of the opinion that the user instruction programme is very useful in promoting the use of CAB International abstracting journals.. It is also observed that 22% respondents do not feel any need of such programme. They might have formed this opinion because the CAB International abstracting journals are self-explanatory. One respondent has not given his views in this regard.

CONCLUSION

The study revealed that a majority of the users feel that the CAB International abstracting periodicals presently subscribed by the university library are adequate to meet their information requirementsand they do not have to depend on other information services. The CAB International abstracting periodicals are playing a vital role in dissemination of scientific and technical information for strengthening research, teaching and extension activities of the university. This study has shown that the CAB International abstracting journals are meeting almost all the requirements of the students and the staff of the University and the library management may chose not to invest more money in subscribing other costly abstracting journals like Biological Abstracts and Chemical Abstracts with the present limitations in budget.

The study has also drawn attention to some of the difficulties experienced by the users. The suggestions given by them can be of good help in removing the short-comings and thus strengthening the library facilities and services.

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Annals of Library Science and Documentation 1991, 38(2), 74-78

USE OF LIBRARY AND INFORMATION SERVICES IN DEVELOPMENT PLANNING - CASE OF LOCAL GOVERNMENT DECISION MAKERS IN IMO STATE, NIGERIA

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School of Social Sciences
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Describes the importance of the libraries and information centres in decision making by the administrators and managers. Reports a survey which was conducted to study the use of libraries and information centres by the administrators and decision makers of the IMO state in Nigeria. Suggestions are also made to establish the libraries in various government departments, make an assessment of the requirements of the decision makers and acquire relevant information sources in the library.

INTRODUCTION

Local governments are created to bring development to the grassroot. Therefore, the planners and administrators of local government are involved in various policy and decision making processes which are intended to bring about the development of the local areas and communities of the country. Development whether at national, state or local government level, is a process of generating resources and more efficiently allocating them for achieving greater socially-satisfying ends [1]. The generation and allocation of resources must be based on valid facts and data which are to be provided and made accessible to those involved in developmental planning and decision making processes.

For the planners and decision makers of local government in Imo state in particular and Nigeria in general, it is essential to make adequate use of relevant information to arrive at valid and rational decisions. The sources of such information have to be made accessible to them. The quality of any planner's decision depends on the quality of information upon which such decisions are based. The quality of information, in this context, means relevance, accuracy, up-to-date ness, reliability and timely ness.

Information is a critical ingredient in decision-making. It is knowledge communicated by others or obtained by personal study, investigation, intelligence, derived from reading, observation or instructions in any society [3]. Precisely, information is regarded as data to be used in decision-making [2]. It can be said that the information is an essential tool for the planners and decision makers and the libraries and information centres are the stores and gate keepers of information. They help the decision-making by supplying the required information. Libraries and information centres collect, process, organize, store, and preserve information and retrieve and disseminate it to the policy and decision makers whenever they need. By doing so, the libraries have become veritable tools of information for the planners and administrators. The role of a library becomes more significant when it gathers, processes, stores and diffuses information on economic, political, social, educational, scientific, technical, cultural and aesthetic affairs.

OBJECTIVES

The decision-makers of the local government take a lot of decisions relating to the development in the state. These decisions depend on the information available in the libraries and information centres. In Imo state, a number of libraries exist which provide a wide range of information services to fulfil the information needs of local government planners and decision makers. However, it is not yet known whether the services of the existing libraries are properly utilised by them or not. Therfore, a study was undertaken to determine the role played by the libraries in providing information service to their users. The study had following specific objectives:

a) To identify the informaion needs of local government policy and decision makers in Imo state,

b) To ascertain the sources of informaion used by them,

c) To determine the extent to which the available library and information services satisfy their information needs,

d) To identify the factors that influence the use or non-use of available library and information resources in decision making, and

e) To improve the use of information services by local government decision makers in the state.

METHODOLOGY

Survey method was used for collecting the data for the study. The subject consisted of 300 top officials and functionaries of local governments drawn from thirty local government areas of the Imo state. Since the study was basically concerned with information utilization in decision-making, the respondents were randomly chosen from the senior staff cadre in the local government administration in the state. Data was collected by using a questionnaire developed by the researcher.

Following information was collected with the help of the questionnaire.

- Name of the user and the local government area,
- Sex of the user,
- Status,
- Information requirements,
- Information sources used, and
- Information utilization.

The questionnaire was administered to the respondents with the help of the final year library Science students of Imo State University. The reliability of the information gathered by the questions was tested by the researcher's colleagues on a sample of ten top officials of Obowu Local Government Area, and its adequacy was established. In addition to the questionnaire, the researcher conducted oral interviews with a representative sample of the respondents in order to cross-check the information. This also helped in ascertaining more facts.

ANALYSIS AND RESULTS

The data collected from the respondents through the questionnaire was analyzed. Out the 300 questionnaires distributed, 280 were returned and were found usable. This represented response rate of 93%.

With regard to the information needs of the respondents, all the respondents reported that they required information in development planning and decision making. The respondents indicated that their information needs were centred on job/career, educational, economic, social, political, cultural recreational, aesthetic, and current affairs. All of them were of the opinion that they require information for decision making.

On the question of the respondents' awareness of their information needs, all of them expressed the awareness of their information requirements. However, they indicated different strategies or approaches used by them in satisfying their information needs. (Table 1)

It is surprising that only 40 (14.3%) respondents out of 280 indicated the use of libraries in solving their information problems. Maximum number of respondents depend on official records to satisfy their information needs.

The respondents were also asked to indicate the type of materials they used in gathering information. 67(23.9%) respondents reported to have used books, 57(20.3%) depended on official records, 48(17.2%) used newspapers while 37(13.2%) got their information from oral sources. Journals, magazines and advertisements were also used by 27(9.6%), 23(8.3%) and 21(7.5%) respectively.

Table 1
Information Sources Used by Respondents

Information Sources	No. of Respondents	Percentage
1. Official records	70	25.0
2. Colleagues	52	18.6
3. Radio/Television	50	17.8
4. Newspapers	44	15.7
5. Libraries	40	14.3
6. Personal book collection	24	8.6
Total	280	100.0

The respondents who indicated the use of libraries as information sources were requested to express their opinion on the extent the libraries satisfied their information needs. The information needs of 70% of them were satisfied by the available library resources. The reasons given by the respondents for not getting satisfied by the libraries included:

- Lack of up-to-date information,
- Non-availability of the books they required,
- Lack of relevant and related information materials, and
- Lack of cooperation by the library staff.

On the issue of the type of libraries they used in satisfying their information needs, 18(45%) out of the 40 respondents who used libraries reported that they used public libraries. This was followed by 7(17.5%) who used university libraries, 6(15%) of them used college libraries, 4(10%) consulted special libraries, 3(7.5%) used school libraries, while 2(5%) used national library.

The high percentage of the respondents using public libraries, perhaps, is an indication of the respondents' awareness of the importance of public library services in the provision of information development matters.

The respondents were also asked if they encountered difficulties in using libraries. 18(45%) respondents expressed their difficulty in determining the type of library to approach for their information needs, 12(30%) of them expresed their difficulty in ascertaining the information materials to be consulted while 10(25%) respondents experienced difficulties in locating and retrieving information materials in libraries.

The frequency of library use by respondents is given in Table 2.

Table 2
Frequency of Library Use

Frequency	No. of respondents	Percentage
Occasionally	25	62.5
Daily	-	-
Once a week	-	-
Once a fortnight	2	5.0
Once a month	13	32.5
Total	40	100

The respondents were requested to indicate the reasons for using the libraries. 14(35%) respondents used libraries because of the quick and ready services provided by them, 12(30%) of them used libraries because they (libraries) provided varied information materials, 10(25%) consulted libraries because of the availability of free service in the libraries while 4(10%) used libraries and information services because of the cooperative attitude of the library staff.

The following reasons for non-use of library and information services were given by the respondents:

a) Lack of awareness of the usefulnes of libraries as information sources;
b) Distant location of libraries;
c) Non-availability of libraries in local government departments;
d) Lack of transportation and communication facilities to maintain links with libraries;
e) Lack of an instruction manual for using library; and
f) Lack of finance for maintaining library.

All the respondents expressed the desire of having libraries in local government departments which shows that the provision of libraries will go a long way in satisfying the information needs of administrators and managers in decision making.

The respondents were also requested to give suggestions for better use of library services. All the respondents agreed that the establishment of libraries at local government headquarters would satisfy their information needs to a great extent. 80(28.6%) indicated that the availability of a near-by public library would also give them additional facility to acquire information. 75(26.8%) required an instruction manual to use the library, 50(17.8%) were of the opinion that the provision of mobile library services would help them to access the library material while 40(14.3%) needed direct communication link with the libraries. 35(12.5%) respondents indicated that adequate publicity and advertisement of the library services would improve their use by the administrators and managers in planning and decision making.

CONCLUSION

The results of the study have far-reaching implications for the provision and use of information by local government decision-makers. Another survey had also shown that the local government decision makers in the state have a universe of unsatisfied information needs [4]. The implication of this is that they need a wide range of reliable information services to satisfy their needs. Their access to required information will enhance their capabilities of decision-making as well as the quality of their decisions. This calls for an adequate provision of libraries providing information to the policy and decision makers of the local government.

The investigation has also shown that some of the respondents were not aware of the importance of libraries as information centres. This may be attributed to lack of adequate publicity and advertisement on the part of libraries of the information services provided by them. To create consciousness of the crucial role of libraries in the provision of information, the library managers in the state especially those of the public libraries should publicize their services so that the local government decision makers and the general public become aware of the availability of library and information services in the state. As can be seen from results of the study, the respondents consulted different types of materials in gathering information. This implies that the library and information managers should provide the local government planners and decision makers with the information in required formats and packages.

The study revealed that the available library and information services did not satisfy the information needs of the respondents. This is where the managers of the libraries particularly those of the public libraries need to pay greater attention. The managers and information experts should try to identify the information needs of planners of the local government and take necessary steps to fulfil them.

It is also noted from the study that the respondents used different types of libraries in order to satisfy their information needs. The higher percentage of the respondents using public libraries is indicative of the multi-purpose nature of public libraries and also the adequacy of services with which they cater to the information needs of the respondents. It is also suggested that the local government decision makers should diversify their use of libraries, that is, they should extend their information gathering to other libraries in the state also.

The provision of an instruction manual for the library user is suggested to solve the problem of the respondents in information gathering. The reasons adduced by the respondents for their non-use of the library and information services have serious implications. Efforts should be made by the state government to establish more public and rural libraries in the state to make an effective utilization of information resources. Local governments in the state should also set up libraries in each local government headquarters. Such libraries will provide adequate and relevant information to local government decision-makers. In conclusion, the following recommendations are made:

a) The state government should establish more divisional, branch, rural and public libraries.

b) A library should be established in each local government headquarter.

c) The Imo state library board should extend its mobile library and information services to local government administrators and decision makers.

d) Public library managers in the state should extend their current awareness service to the local government administrators.

e) The decision makers and planners of local government should use all types of libraries to satisfy their information needs.

f) User studies may be carried out from time to time with a view to determining the needs of users, and providing better services to them. This will help the managers of the libraries to tailor their services according to the needs of the users especially the decision and policy makers of local government.

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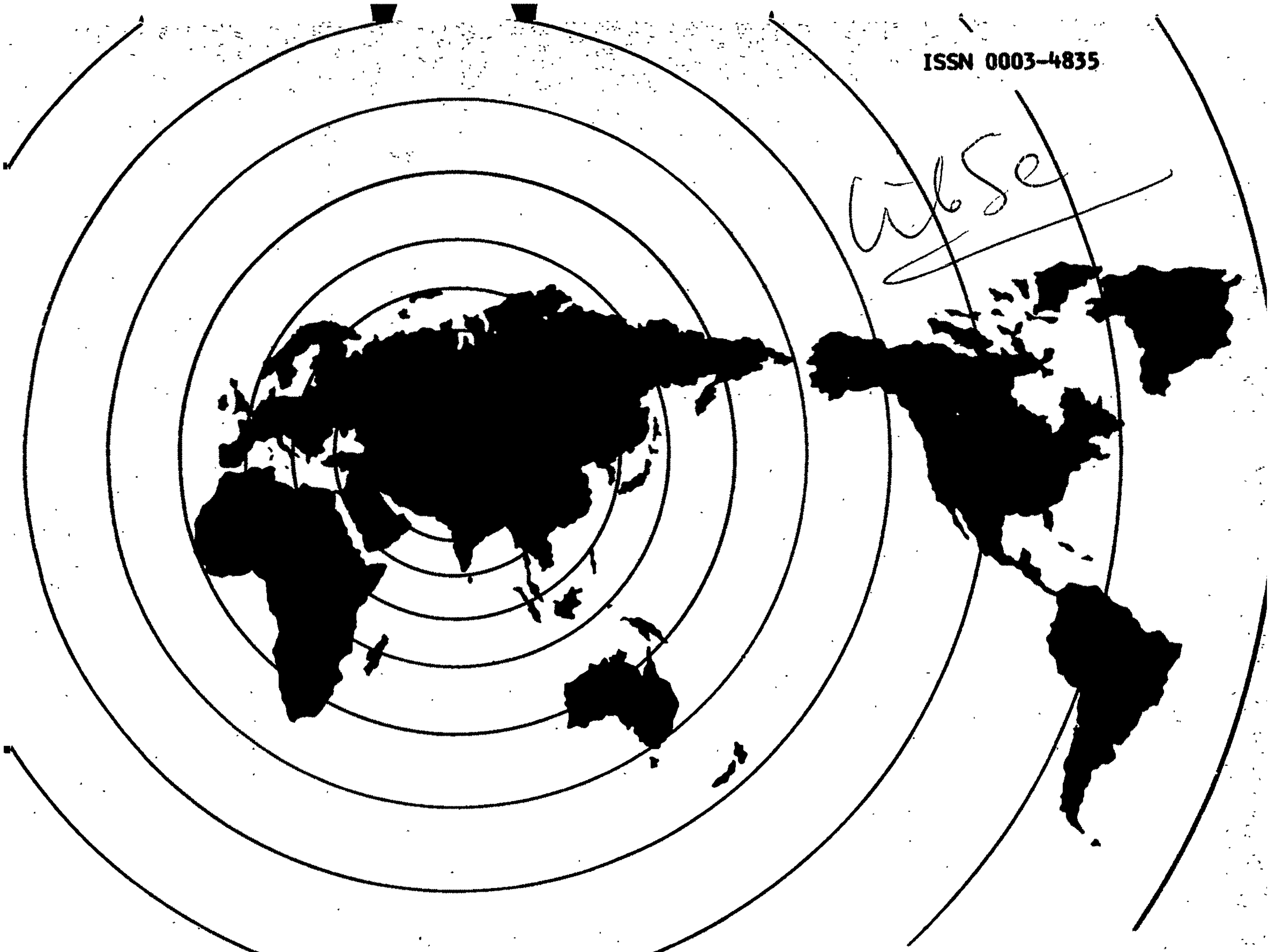

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EMERGING STANDARDS FOR LIBRARY NETWORKS

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The paper discusses the emerging standards for both the bibliographic and the network based library services. The role of CCF has also been illustrated. The service definitions and protocol specifications of the standards for inter library lending and search and retrieval of data bases are briefly explained.

INTRODUCTION

In the context of the present day phenomenon of information explosion, the library and information services are entering an era of co-operation from an era of compartmentalisation. Sharing of information resources and co-operative working have become imperative. The factors contributing to such a development are:

a) Social needs,
b) Economic requirements, and
c) Technological developments.

Society has come to depend much on information for its existance. A nation's development is heavily dependent on its ability to acquire, manage and selectively assimilate and use information. "Information is power" is no longer a buzz phrase but a hard reality to reckon with. The prices of publications and information bases are sky-rocketing continuously while library budgets have remained more or less static in the sense that they have been fetching the same or even a smaller number of journals and books over the last few years. For accessing new information and knowledge to the maximum, there is no option except to pool the economic resources to acquire a larger number of publications and information bases. After such an acquisition, the problem of sharing the information still remains to be solved.

The first step to solve the problem is the commitment from the concerned parties to share the information. The second step is the technological support to effect an efficient sharing of information. Fortunately, the developments in the field of Information Technology (IT) permit an easy and economic sharing of information. Facsimile, computer based information networks, electronic databases and optical storage devices (CD-ROM) are some of the IT products that help in sharing of information.

Information sharing brings in its wake the need for standardisation for the sake of purposeful interaction over networks and exchange of information on electronic media. Accordingly standards may be viewed in two categories: bibliographic standards and standards for library services on networks.

Bibliographic standards are concerned with handling of bibliographic information in machine readable form. Standards for library services on network deal with how to implement library services across a network. In this paper are discussed the two categories of standards that are currently emerging.

BIBLIOGRAPHIC STANDARDS

In recording bibliographic information in electronic form, two distinct areas requiring standardization are:

a) Cataloguing, and
b) Abstracting and Indexing (A & I) Services.

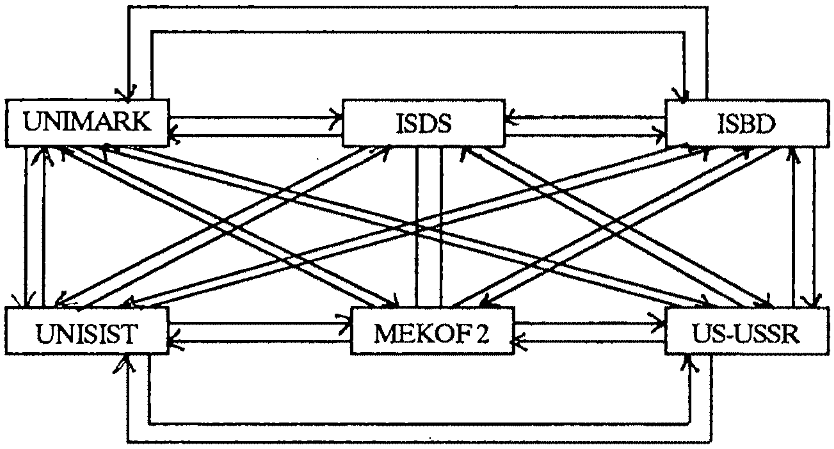

Fig. 1 : Conversion Programmes without CCF

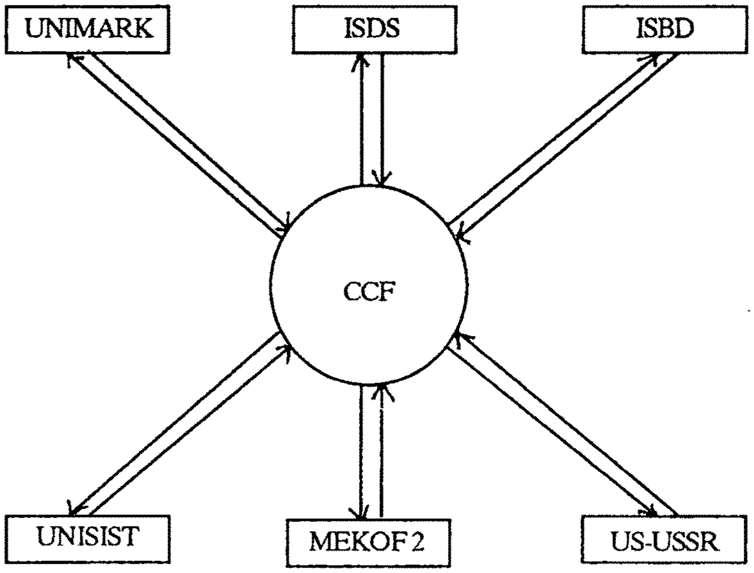

Fig. 2 : Conversion Programmes with CCF

Earlier, bibliographic standards evolved around cataloguing for the obvious reason that the function of cataloguing has been in existence for a much longer period than the A&I services. The latter is relatively of a recent origin. MARC (Machine Readable Catalogue), UKMARC, USMARC and UNIMARC are examples of bibliographic standards which were evolved keeping cataloguing requirements in mind. UNIMARC is a common standard evolved by combining both USMARC and UKMARC to provide a single common denominator for exchange purposes, particularly among the national libraries. UNIMARC having become somewhat community oriented among national libraries, other specialized and subject oriented institutions tended to develop their own standards. These include, INIS AGRIS, ISDS, etc.

With the appearance of A & I services on a large scale, UNESCO evolved a standard known as UNISIST Reference Manual which became very popular in the community of abstractors and indexors. While UNIMARC adopts International Standard for Bibliographic Description (ISBD) for describing the data elements, UNISIST Reference Manual defines its own content designators to be assigned to bibliographic descriptions of various types of materials.

All the above said formats were designed to serve the purpose of a limited range of institutions. They define, organise and identify data elements in quite different ways and rely upon different sets of codes for use in their coded elements. As a result, mixing and exchanging of databases created by various institutions in different formats became a serious problem. It required a number of conversion programmes for mixing the data. This is illustrated in Fig. 1 which brings out that 30 different conversion programmes are required for mixing and exchanging of databases in six different formats. Likewise, for 20 different standards followed by different agencies, 180 different conversion programs are required to enable a free flow of information among them.

The need to simplify the process of bringing together the information fragmented into separate groups was soon recognised by the international agencies and UNESCO set in progress the process of defining the Common Communication Format (CCF). CCF aims to facilitate the communication of bibliographic information among different sectors of the information community by providing a common medium of exchange among them. CCF would help move towards establishing international networks of various types of bibliographic agencies. With the introduction of CCF, the process of exchaning information among different databases becomes simpler as depicted in Fig. 2. Now it is required to write only two programmes for conversion of data from a given format to CCF and vice versa. Thus for 20 different formats it is required to develope only 40 conversion programs using CCF as the intermediate format.

CCF is derived from both MARC and UNISIST formats. It is suitable for both library catalogues and A & I services. CCF incorporates the features of both UNIMARC and UNISIST and strictly conforms to the international standard ISO: 2709 for record structure. The main purpose of CCF is to provide a detailed and structured method for designating a number of mandatory and optional data elements in a bibliographic record. Enumeration and definition of the data elements in CCF help the bibliographic agencies to build their own format while remaining compatible with CCF. Use of CCF data elements in non-computerised bibliographic systems would also simplify the process of computerisation later on.

NETWORK STANDARDS

Electronic Information Networks wherein information is stored and transmitted in electronic form play a keyrole in the process of information exchange. The computers which store and process information and the communication technology which permits the transport of information in electronic form are the basis of such networks. It is the combination of computer and communication technologies that has made electronic information networks possible. The coming together of these technologies started in late 1950s and the computer communication or communications as it is often called, has emerged as a field of great importance.

Information exchange across a network of computers calls for standardisation in procedures and processes. In particular, this is so when the network consists of heterogeneous computers, i.e. computer systems from different manufacturers using different hardware and software. ARPANET, the network project supported by the Advanced Research Projects Agency of the Department of Defence, United States, is one of the pioneering efforts in interconnecting heterogeneous systems. The efforts in this direction led to the emergence of world standards. These standards commonly known as ISO-OSI (International Standards Organisation - Open System Interconnection) Reference Model, are widely accepted. The phrase 'Open Systems' implies that a computer system which conforms to this reference model is capable of information transfer with any other computer system of any manufacturer conforming to the Open System Reference Model.

Standards for library networks are concerned with how to implement library services across the electronic information networks. These standards are evolving around the ISO-OSI reference model. At present, standards for two library services, viz. Inter Library Loan (ILL) and Search and Retrieve (SR) service, are under considration.

ISO-OSI REFERENCE MODEL

The architecture of international standard ISO-OSI Reference Model ISO: 7498 is shown in Fig. 3. It consists of seven layers for various functions. Layering as a structuring technique has been used to allow the networking function to be logically decomposed into independent smaller functions and to permit an orderly evolution of standards. The services of a layer add values to the services provided by a set of lower layers in such a way that the highest layer is capable of running distributed applications. The logical interfaces between adjacent layers are provided through a set of well defined Service Access Points (SAP) which permit complete freedom in the implementation of the services as long as the interface conventions are adhered to.

The functions or services of different layers are well defined. The functions are implemented by a set of entities within each layer. The entities of the same layer in different systems are known as peer entities. Peer entities communicate with each other by using a set of peer protocols. As a consequence, standards for any layer of OSI reference model deal with both services and protocols. In the OSI environment, a service may be offered in any of the two modes:

a) Connection-oriented service
b) Connectionless service

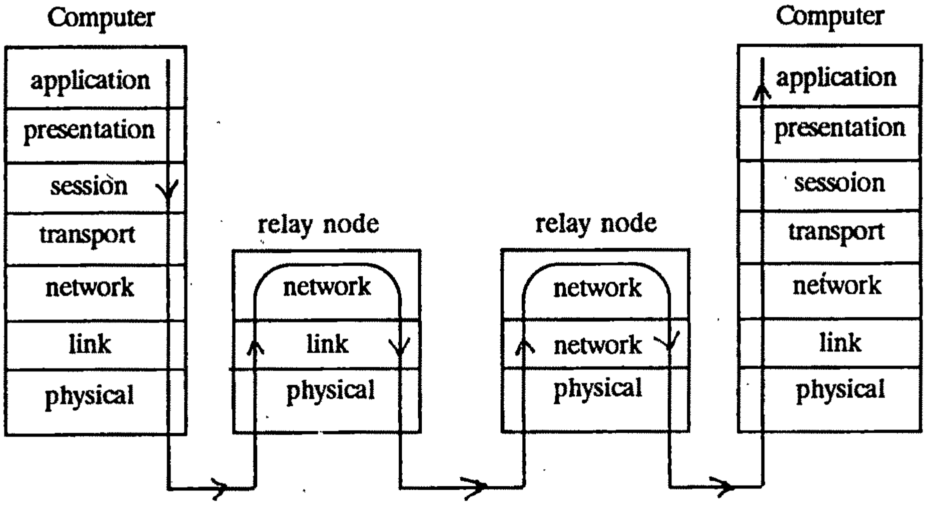

Fig. 3 : ISO/OSI Reference Model

In connection-oriented service, a virtual connection is established between the source and the destination before data transfer begins. A virtual connection is one where certain set-up messages are exchanged whereby the communicating parties agree on the format of the data to be exchanged and the rate of its transfer. A virtual connection also implies that there is no physical connection between the communicating parties unlike in the case of a telephone conversation. A typical example of a connection-oriented service is on-line access to a database.

In connection-less service, information is dispatched to the destination without ascertaining its readiness or agreeability to receive the information. Electronic mail is a typical example of a connection-less service.

LAYER FUNCTIIONS

The lowest layer of the OSI Reference Model i.e. the physical layer, deals with encoding/decoding of messages and the bit level transmission of electronic signals through the available transmission medium. The data link layer is concerned with error-free transmission of messages or packets. Its entities deal with error detection, automatic retry, etc. The main function of the network layer is to organise inter-network interfaces. The entities of this layer deal with network addressing, protocol conversion, routing etc. The standards for all these three layers i.e. physical, datalink and network are clubbed together into one important CCITT standard specification known as X. 25.

While the lower three layers are considered to be the responsibility of the network provider, the transport layer is considered to be the first user level layer. This layer is concerned with end-to-end data transfer. For example, transferring a full file from one system to another is the responsibility of the transport layer.

Session layer is concerned with process synchronisation, access, security etc. Computer systems from different manufacturers use different formats for file storage and data representation, different terminal types, etc. Across the network, it is necessary to have a uniform representation of information and this is achieved at the presentation layer. Application layer is the actual user interface and it comprises entities that implement application related functions. These include File Transfer and Access Management (FTAM), Electronic Mail function, etc.

In the context of library networks in the OSI environment, most of the developments would take place at the application layer level.

The areas in which standards are being evolved currently are Inter-Library Loan (ILL) and Search and Retrieve (SR). The specifications of protocols and services for ILL and SR are to be implemented as entities in the application layer.

INTER LIBRARY LENDING PROTOCOL

As mentioned previously, a standard for an application or a function in a network has two distinct definitions:

- service defintion; and
- protocol specifications.

Accordingly, two draft proposals (DP) are under consideration at ISO for Inter Library Lending application. They are:

- DP 10160 - Inter Library Loan Service Definition
- DP 10161 - Inter Library Loan Protocol Specification

The ILL service provides capabilities to request the loan of returnable bibliographic items, such as books and microfilms or non-returnable items such as photocopies of journal articles. Related procedures, such as loan renewal, item recall, overdue notification, etc. are also supported by this service. The actual interchange of the request material is not a part of the ILL service and protocol but is achieved by external mechanisms like postal service or facsimile transmission. ILL protocol does not introduce a new methodology for performing ILL activities but attempts to formalise the existing practices in such a way that they may be carried out on a network in an automated environment.

There are three types of ILL message transmissions:

- simple
- chained
- partitioned

In a simple ILL transaction, there are only two parties, the requester and the responder.

In a chained transaction, atleast three parties are involved, a requester, a responder and atleast one intermediary.

In a partitioned transaction, once again atleast three parties are involved as in the case of chained transaction. In the former case, the intermediary withdraws soon after a firm contact is established between the requester and the responder whereas in the latter, the intermediary is active all the time.

SEARCH AND RETRIEVAL

As in the case of ILL, the definition of standard for Search and Retrieval (SR) function includes both service and protocol. They are:

- DP 10162 - SR Service Definition
- DP 10163 - SR Protocol Specification.

The SR service is modelled as a pair of application processes, each of which is located in a separate open system. Within each application process, there are two types of functions: local processing functions, and communications related or OSI related functions. The former deals with activities such as database manipulation, query evaluation etc. while the latter is concerned with interaction with a peer entity in another system.

An application process may act as a database user known as the origin or as a potential database provider known as the target. A search query may be sent to a target system where it is applied to a database. The query specifies values to be matched against the specified fields of the database. The subset of records formed by applying the search query is termed as a result set. The result set does not necessarily consist of the selected records themselves but could be used as identification pointers to the required records. A result set may be manipulated in further query standards.

There are six service elements defined in SR application. They are as follows:

INITIALISE - to initialise communication with a database provider for subsequent commands.

SEARCH - permits a database user to search a database at a remote site; outcome is a result set
PRESENT - permits a database user to retrieve records from a result set

DELETE-RESULT SET - permits a database user to delete a result set at the database provider

SR-RELEASE - permits a database user to orderly terminate an association

SR-ABORT - permits a database user or database provider to request abrupt termination of the association.

The evolution of standards for other functions involved in the exchange of information over a network is addition to ILL and RS. are absolutely essential to facilitate the members of the scientific community all over the world to access and acquire any document available any where in the world which may be of any use to them.

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APPLICATION OF BRADFORD'S LAW TO CITATION DATA OF ETHIOPIAN MEDICAL JOURNAL

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Citographies were compiled for citation data (citations given to journal items) of items published in 1977 and 1987 volumes of Ethiopian Medical Journal. Citographies were analysed and Bradford's Law was applied to them to test its applicability. Rank list of journals based on the number of citations received by them, was made for 1977 and 1987. The two data sets show the phenomenon of wide scattering of citations in a large number of journals. Only 10% of the journals received 50% of all the citations. Citographs were drawn in a manner similar to bibliograph to test the data with Bradford's Law. Various parameters were determined to test Bradford's Law, using Brookes' and Wilkinson's formulations. Bradford's was found satisfactorily applicable to both data sets. The ranking pattern of journals changed from 1977 to 1987.

INTRODUCTION

Bibliometric studies have become very popular in recent years. The literature on the subject has been growing rapidly over the past three decades. Bibliometrics is the study and measurement of the patterns of all forms of recorded information and their producers. Bradford [1] first observed that periodical articles on a subject tend to be scattered over periodical titles according to "zones" of decreasing productivity of these titles. Many later studies confirmed this phenomenon of scatter in various subject areas, analysing data from bibliographies, indexing/abstracting services or machine-readable data bases. Gupta [6] satisfactorily applied Bradford's Law on the citography of sea-floor spreading. Prabha and Lancaster [12] reported interesting results comparing the data of citing and cited literature of desalination and educational psychology. Cited literature was found to be more scattered than the citing literature.

Citation analysis is one of the areas of bibliometrics which deals with the study of relationships of the citing and cited contribution(s), contributor(s), journal(s), etc. Citation studies are recognised for their practical use. Line and Sandison [9, 10] made a number of useful recommendations on the basis of citations for building library collections. Researchers depend on citations given in the literature for further studies, building concepts, changing perceptions, etc. and use cited materials for their work. Hence, citations are useful units of measurements for selection of suitable materials in the library and for many other purposes concerning information management. Recent articles by Smith [13] and Broadus [2] review various concepts related to citation analysis.

SCOPE AND OBJECTIVES

In developing countries, the pattern and output of research depends on many changing factors like specific research problems, mobility of researchers and the resources abailable in the laboratory and the library or information centre at a particular time. Considering these factors, for any bibliometric study related to the literature of research activity in any area, it is preferred to analyse the bibliographic data obtained from local sources. Therefore, the Ethiopian Medical Journal (EMJ) was chosen for this study. Local peculiarities are lessened somewhat in favour of more data if obtained by citation analyses of national or local sources.

Line and Sandison [9] pointed out that the ranks of important journals as measured by citation studies change from year to year and these changes are more likely to affect the titles occurring in the middle range.

Therefore, it was decided that the data for atleast two different years, i.e. 1977 and 1987 may be collected and analysed.

Very few studies have been conducted on the literature from developing countries. Almost nothing has been reported about the characteristics of literature from Ethiopia. Recently an attempt was made by Gupta [7] to analyse the Ethiopian literature of medical sciences. The results were found quite interesting. Among many other findings, it was reported that the journal articles were the most heavily cited items, i.e. 80% by the medical researchers in Ethiopia. Therefore, it was thought that a separate study should be conducted to study the characteristics of journal cited items.The study was limited to the data compiled from the citations of journal articles in 1977 and 1987 volumes of EMJ. It was assumed that:

a) The distribution pattern of citation data should reflect the phenomenon of wider scattering;

b) The citation data should follow Bradfordian distribution.

Treating citations as items and journals as sources, an attempt was made to test the applicability of Bradford's Law to the distribution of citations among the journals.

The main objectives of the study were:

a) To study the phenomenon of scattering for citation data;

b) To identify the core journals as indicated by citation frequencies;

c) To identify the differences, if any, in the ranks of journals in 1977 and 1987;

d) To test the distribution against Bradford's Law; and

e) To study the characteristics of citographs.

Ethiopian Medical Journal (EMJ) is published by the Ethiopian Medical Association, Addis Ababa Ethiopia. The terms Citography and Citograph (used for the first time in the literature) have been defined in an earlier study of similar nature [6].

METHODOLOGY

Data used in this study were derived from various issues of EMJ-1977 and 1987. A total of 388 citations were recorded from 1977 issues of EMJ, out of which 339 (87.4%) were received by journal articles. Frequency of citations was counted for each journal and a rank list of journals was prepared. A total of 106 journals were cited in 1977. Similarly, data were collected from all the issues of 1987. A total of 131 journals received 375 citations (79%) out of a total of 475 citations.

To test the applicability and validity of Bradford's Law, two different formulae were used on both data sets. Brookes' formulation of the complete Bradford-Zipf distribution provides for both the verbal and the graphical application of the law [3].

Wilkinson [14] devised a comparative test for verbal and graphical formulations utilising the data of the same bibliography for four different subject areas (i.e. agriculture economics, muscle fibre, schistosomiasis and mast Cell).

Only p (the number of journals) and S (the corresponding cumulative number of papers) should be known to apply the formula. Both p and S are obtained from the plot of the empirical data on semilog paper (Fig. 1). The values of p and S could be chosen anywhere in the linear portion of the curve. By identifying 2S papers on the plot, the corresponding number of journals called q is to be obtained. The values of p, q, S and 2S are to be used to calculate the value of R (n) and N for both verbal and graphical formulations for Bradford's law using the following formulae:

Table 1
Citation Trend of Journal Literature in Medical Sciences in Ethiopia during 1977

No. of Citations	No. of journals	Cumulative journals	Cumulative journals, Percentage	Total no. citations to journals of equal rank	Cumulative citations	Cumulative Citations, Percentage
40	1	1	0.94	40	40	11.80
29	1	2	1.89	29	69	20.35
17	3	5	4.72	51	120	35.40
11	1	6	5.66	11	131	38.64
10	1	7	6.60	10	141	41.59
8	2	9	8.49	16	157	46.31
7	2	11	10.38	14	171	50.44*
6	4	15	14.15	24	195	57.52
5	2	17	16.04	10	205	60.47
4	4	21	19.81	16	221	65.19
3	5	26	24.53	15	236	69.62
2	23	49	46.23	46	282	83.19
1	57	106 (JJ)	100.00	57	339 (CC)	100.00

JJ = 106 = Total number of journals cited;
CC = 339 = Total number of citations received by 106 journals;
Average per journal = (CC)/(JJ) = 339/106 = 3.2 citations;
** Only 10% of all the journals received a total of 50% of all citations
53 journals received 286 citations (50% of all journals received 84.4% of all citations)

Table 2

Citation Trend of Journal Literature in Medical Sciences in Ethiopia during 1987

No. of citations	No. of journals	Cumulative journals	Cumulative journals, percentage	Total no. citations to journals	Cumulative citations	Cumulative Citations, Percentage
57	1	1	0.76	57	57	15.20
23	1	2	1.53	23	80	21.33
20	1	3	2.29	20	100	26.67
16	1	4	3.05	16	116	30.93
11	1	5	3.82	11	127	33.87
10	1	6	4.58	10	137	36.53
8	2	8	6.11	16	153	40.80
7	3	11	8.40	21	174	46.40
6	3	14	10.69	18	192	51.20 **
5	3	17	12.98	15	207	55.20
4	3	20	15.27	12	219	58.40
3	9	29	22.14	27	246	65.60
2	27	56	42.75	54	300	80.00
1	75	131 (JJ)	100.00	75	375 (CC)	100.00

JJ = 131 = Total number of journals received 375 citations;
CC = 375 = Total number of citations received by 131 journals;
Average per journal = (CC)/(JJ) = 375/131 = 2.9 citations;
** Only 10% of all the journals received a total of 50% of all citations
66 journals received 310 citations (50% of all journals received 82.7% of all citations)

Verbal Formulation

$$N = \frac{S}{\log_e \alpha} - \frac{P}{\alpha - 1} \qquad \text{.................. (1)}$$

Where N = expected total number of journals and

$$\alpha = \frac{q - p}{P}, \quad \text{and}$$

$$R\ (n) = \frac{S}{\log_e \alpha} \times \log_e \left[\frac{S}{\log_e \alpha} \times \frac{(\alpha - 1)}{P} \right] \qquad \text{.............. (2)}$$

Graphical formulation

$$N = \frac{S}{\log_e \beta} \qquad \text{.................. (3)}$$

$$\text{where } \beta = \frac{q}{p} \quad \text{and}$$

$$R\,(n) = \frac{S}{\log_e \beta} \times \log_e \left[\frac{S}{\log_e \beta} \times \frac{\beta}{p} \right] \qquad \text{............... (4)}$$

RESULTS

Scattering of Citations

The data for the scatter of citations over periodical titles for 1977 and 1987 are given in Table 1 and Table 2 respectively. Out of all the 106 journals, only 11 journals (10%) have been cited 171 times (about 50% of all the citations) for 1977 data. Similarly for 1987 data, only 13 out of 131 journals have been cited 186 times, i.e. 10% of all the journals were cited by 50% of all the citations. Therefore, in both the cases, upto 50% of all the citations were received by only 10% of all the journals. This very clearly shows the phenomenon of high scattering - a very few citations given to a large number of journals. A number of other methods, as given below, are also used to study the phenomenon of scattering.

Average number of citations per periodical: The more scattered the literature, presumably, the fewer are the citations per periodical on an average. The average number of citations per periodical is 3.2 and 2.9 for 1977 and 1987 respectively. This suggests a very high scattering and comparatively more scattering in the case of 1987 data.

Table 3

Bradford Zones of Scattering for EMJ-1977

Zones	Number of citations in each zone	Number of periodicals observed in each zone	Number of periodicals expected in each zone	Bradford multiplier, bm
1	56	1.55	1.55	
2	57	3.04	3.19	1.96
3	58	6.41	6.58	2.11
4	56	12.00	13.55	1.87
5	55	26.00	27.91	2.17
6	57	57.00	57.50	2.19
Total	339	106.00	110.28	10.30

Geometric mean of bm = 2.06

Table 4

Bradford Zones of Scattering for EMJ-1987

Zones	Number of citations in each zone	Number of periodicals observed in each zone	Number of periodicals expected in each zone	Bradford multiplier bm
1	75	1.78	1.78	
2	75	5.85	4.59	3.29
3	75	14.38	11.85	2.46
4	75	34.00	30.57	2.36
5	75	75.00	78.87	2.21
Total	375	130.74	127.66	10.32

Geometric mean of bm = 2.58

Scattering Index (SI), i.e. the proportion of periodical titles that were cited only once to the total number of journals: The greater the proportion, i.e. Scattering Index (SI), the more the scatter is implied. For 1977, the SI is 0.538 (57/106) and for 1987, it is 0.573 (75/131) suggesting that both data sets exhibit scattering and that citations in 1987 are more scattered than in 1977. Prabha [12] found it to be 0.454 for desalination data and 0.562 for educational psychology. On the other extreme of the Bradfordian distribution, one could look at the proportion of the citations received by the periodical in the first rank. The greater its proportion (=SIb), the less scatter is implied. For 1977 and 1987 data, this proportion (=SIb) is 0.118 (=40/339) and 0.152 respectively. Here, also the scatter is reflected in both the cases but in the reversed order (more scatter is observed in 1977 than 1987). Prabha's values are 0.043 for desalination and 0.067 for educational psychology. Prabha's data are very large in comparison to the data of this study but he also found reversal according to this formula.

Zoning of Periodicals: Another way to measure the scattering is by dividing the data into Bradford's zones. Clearly, a decision is to be made about the number of zones to be used. Bradford himself divided his data into three zones of roughly equal number of articles, but there is nothing to prevent the division to be made on the basis of four, five or more zones. The mean values for Bradford multiplier (bm) were calculated. The smaller the bm, presumably, the lower is the scatter. Although the value of bm also depends on the size of data, larger the data, larger the value of bm. The data of the zonal analysis for the two are given in Table 3 and Table 4. The average values of bm for 1987 and 1977 were found to be 2.58 and 2.06 respectively, suggesting again the phenomenon of scattering in both the cases and more scattering in 1987.

Ranking of Journals: The citations trend of journal literature is given in Tables 1 and 2 and is explained as follows:

EMJ-1977: The periodical ranking first by the number of citations, received 40 citations, the second received 29 and so on. 57 periodicals received only single citation each, carrying the cumulative sum of the periodicals to 106 and cumulative sum of citations to 339 (Table 1).

EMJ-1987: The periodical ranking first by the number of citations, received 57 citations, the second one received 23, and so on. 75 periodicals received only single citation each, carrying the sum of the periodicals to 131 and cumulative sum of citations to 375 (Table 2).

Application of Bradford's Law

While applying Bradford's Law to the data, following equation suggested by Brookes was used:

$$R(n) = an^b \quad (1 \leq n \leq c) \qquad \ldots. \ (1)$$

for the curved portion, and

$$R(n) = k \log_e n/s \ (c \leq n \leq N) \qquad \ldots. (2)$$

for the linear portion of the citographs;

Where

R (n) = Cumulative sum of citations received by all the journals (n journals; journals of rank 1-n);

a = Number of citations received by the most important journal (journal of rank first);

n = Rank order of journals arranged in decreasing order of number of citations received (n= 1,2,3.......n);

k = The slope of the linear portion of the graph and it is the total number of journals expected in the data base of study;

b = A constant known as Bradford's constant if the citations considered cover only a short time-span (its value is always less than 1);

c = Value of n at the point where the curve runs smoothly into the straight line. Journals ranked 1 to c constitute the nucleus of the journals that have been published on the subject;

s = The value of n at the intercept of the straight line of the graph (if projected and cuts the $\log_e n$ axis).

Results and Observations from the Citographs

The results and the observations derived from the graph and the data are discussed below:

.*The value of c (Core Journals):* Periodicals in the core constitute a substantial proportion of all citations, the number of periodicals given by the values of c serves as an indicator of the most important zone. The number of periodicals in the core for 1977 and 1987 data sets is about 10% of all periodicals collectively. In other words, just about 10% of all journals received upto 50% of all citations.

.*The value of b:* It should be constant if the time period of data is only a short time span. Brookes [3] suggested three years for this period while Lawani [8] reported in one of his studies that the value of b varies even when dealing with the data compiled for a period of one year. He found for a data of four years that b takes initially higher value and starts decreasing as n approaches c. He concluded that "this may be taken to suggest that for a given subject the value of b increases the longer the time span considered". The value of b in both data sets is decreasing with the values of n, i.e. $b = 0.7866$ with $n = 2$, $b = 0.5018$ with $n = 49$ for 1977 data set; and $b = 4890$ for $n = 2$, $b = 0.4126$ for $n = 56$ for 1987 data set. Considering the length of the period covered by the citographies, the variation in the values of b is not much, as expected. The avarage values of b should be accepted as the ideal values of b as they are near to the values of b where $n = c$. The details of calculations for the value of b are given in Table 5.

.*The Value of R (n) and N:* Applying the Wilkinson's formulae (1), (2), (3), (4), for two formulations of Bradford's law, the verbal and graphical, the values of R (n) and N were determined as follows:

EMJ-1977

Verbal Formulation:

$P = 9$; $S = 157$
$q = 74$; $2S = 314$
$\alpha = (q-p)/p = (74-9)/9 = 7.22222$
$\beta = q/p = 74/9 = 8.22222$
$N = 78$ approximately.
Percentage error $= (106-78)/106 \times 100$
$= 26.4$
$R(n) = 318$
Percentage error $= (339-318)/339 = 6.2$

Graphical Formulation:
$N = 75$
Percentage error $= (106-75)/106 = 29.2$
$R(n) = 315$ approximately.
Percentage error $= (339-315)/315 = 7.1$

EMJ-1987

Verbal formulation:
$p = 11$; $S = 174$;
$q = 82$; $2S = 348$;
$\alpha = (q-p)/p = (82-11)/11 = 6.4545$
$\beta = q/p = 82/11 = 7.4545$
$N = 91$ approximately.
Percentage error $= (131-91)/131 = 30.5$
$R(n) = 358$ approximately.
Percentage error $= (375-358)/375 = 4.5$

Graphical formulation:

$N = 87$ approximately.
Percentage eror $= (131-87)/131 = 33.6$
$R(n) = 353$ approximately.
Percentage error $= (375-353)/375 = 5.9$

The percentage error in graphical formulation for both the data sets is little higher than that of the verbal formulation. Percentage errors in case of journals are about 30% while in the case of citations, it is about 6%. This also confirms high scattering of citations in both the cases and comparatively more scattering in 1987. The percentage errors are negative suggesting that there are more citations than required (a few are not relevent ones) and some of the journals are not relevantly cited.

CONCLUSION

Following conclusions are drawn from the study

Table 5.
Values of b for different values of n

EMJ-1977			EMJ-1987		
n	R(n)	b	n	R(n)	b
2	69	0.7866	2	80	0.4890
5	120	0.6827	3	100	0.5117
6	131	0.6620	4	116	0.5125
7	141	0.6474	5	127	0.4978
9	157	0.6223	6	137	0.4894
11	171	0.6059	8	153	0.4748
15	195	0.5850	11	174	0.4654
17	205	0.5768	14	192	0.4602
21	221	0.5614	17	207	0.4552
26	236	0.5448	20	219	0.4493
49	282	0.5018	29	246	0.4343
			56	300	0.4126

average = 6.7763/11 = 0.6160 and 5.6522/12 = 0.4710

Following formula was used to determine the value of b;

$$R(n) = an^b \ldots\ldots \quad \ldots\ldots \quad (A)$$

Example for complete solution in case of EMJ-1977

$a = 40$
$n = 9$
$R(n) = 157$ then
$157 = 40 \times 9^b$
$157/40 = 9^b$
$3.925 = 9^b$
$\log 3.925 = b \log 9$
$0.59384 = b \times 0.95424251\backslash$

Therefore
$b = 0.59384/0.95424251$
$= 0.6223$

Table 6.
Rank List of Core Cited Journals

Sl. No.	Title of Journals	Rank		Number of Citations		Totals Citations combined of 1977 & 1978 Rank
		1977	1987	1977	1987	
1.	Acta Paediat. Scand.	-	12	0	6	
2.	Am. J. Cardiol.	-	10	0	7	
3.	Am. J. Clin. Pathol.	13	-	6	0	
4.	Am. J. Med. Sci.	14	-	6	1	
5.	Am. J. Obst. Gynaec.	20	3	2	20	22/6
6.	Am. J. Trop. Med. Hyg.	16	13	5	6	11/11
7.	Am. Rev. Resp. Dis.	12	22	6	2	
8.	An. Intn. Med.	6	-	11	1	12/9
9.	Ann. Trop. Med. Parasitol.	8	20	8	3	11/13
10.	Arch. Int. Med.	10	21	7	3	10/14
11.	Arch. Dis. Child.	-	15	2	5	
12.	BMJ	7	9	10	7	17/7
13.	Circulation	-	16	0	5	
14.	East African Medical Journal	4	2	17	23	40/2
15.	Ethiopian Medical Journal	1	1	40	57	97/1
16.	Gastro-enterology	-	8	0	8	
17.	JAMA	3	11	22	6	28/5
18.	Lancet	5	4	17	16	33/4
19.	NEJM	2	7	29	8	37/3
20.	Obst. Gyn.	-	6	0	10	10/15
21.	Postgrad. Medi.	15	19	6	4	10/16
22.	Soc. Sci. Med.	-	17	0	5	
23.	Trans. Roy. Soc. Trop. Med. Hygn.	9	14	8	6	14/8
24.	Trop. Geog. Med.	-	5	1	11	12/10

Table 6 (a)

Summary of Ctations Received by Journals

Number of Citations	Number of Journals during 1977	Number of Journals during 1987
0	6	1
1	1	2
2	2	1
3	0	2
4	0	1
5 and more	15	17

a) The most interesting aspect of the study is the application of Bradford's Law to citation data of Ethiopian Medical Journal for two different years, i.e. 1977 and 1987. No such study has been reported in the literature of library and information science so far. It clearly demonstrates that the Bradford's Law can be applied on citation data of local scientific literature and some reasonably valid and interesting results can be obtained. By substituting 'Citation' for 'Article' and 'Citography' for 'Bibliography'; Bradford's Law can be applied satisfactorily to analyse the citation data to identify the use patterns of journals and their ranks accordingly. One obtains a 'Citograph' instead of a 'Bibliograph' and interpret the results accordingly.

b) The application of Bradford's law to the citographies of 1977 and 1987 data of citations of Ethiopian Medical Journal yielded good citographs. The core comprises 10 journals with atleast five citations each. Ethiopian Medical Journal emerged to be the most cited (or most used) journal and East African Medical Journal as number two in rank. A list of comparative ranks of the journals for 1977 and 1987 is given in Table 6.

c) The ranks of journals has changed from 1977 to 1987 which confirms the observations of Line and Sandison [9] that the ranks of journals change substantially from year to year. But the nucleus of journals almost comprises the same journals with variations in the ranks of individual journals. Change in nucleus needs further investigations by taking up the examples of some other country.

d) The study demonstrates its importance in identifying the major journals in medical sciences for specific local situation of Ethiopia.

e) The results obtained in this study also have some implications to suggest that the usage of journal literature depends upon the local situation, i.e. local problems of investigations, and facilities available to the researchers for the laboratory and equipment and information sources at a specific time. The situation is normally variable from one location to another from one time to another and hence it needs care and caution in managing the serials literature in a specific research environment.

f) On the basis of the present studies observations it is sugested that further studies may be conducted to test the applicability of Bradford's Law for the literature in other disciplines in Ethiopia and other developing Countries.

Table 7.
Ethiopian Medical Literature: Summary of Data and Results

Observed Parameters	1977	1987
Total number of citations; R (n)	339	375
Total number of journals : JJ=N	106	131
Citations/Journal	3.2	2.9
Number of citations received by most cited journal (a)	40	57
Number of journals received only single citation each	57	75
Proportion of journal titles that yield only single citation (SI)	0.538	0.573
Proportion of citations received by the journal in the first rank (SIb)	0.118	0.152
Bradford's zones	6	5
Bradford's multiplier (bm)	2.06	2.58
nucleus of journals (c)	9	11
s	0.9	1.05
*S	0.88	1.2

Parameters evaluated by Wilkinson's formula

		1977	1987
(A) Verbal formulation			
	R (n)	318	352
	Percentage error	6.2	4.5
	N	78	91
	Percentage error	26.2	30.5
(B) Graphical Formulation			
	R (n)	314	353
	Percentage error	7.4	5.9
	N	75	87
	Percentage error	29.2	35.6
	b	0.7866 to 0.5018	0.4890 to 0.4126
	Average value of b	(0.6160)	(0.4710)

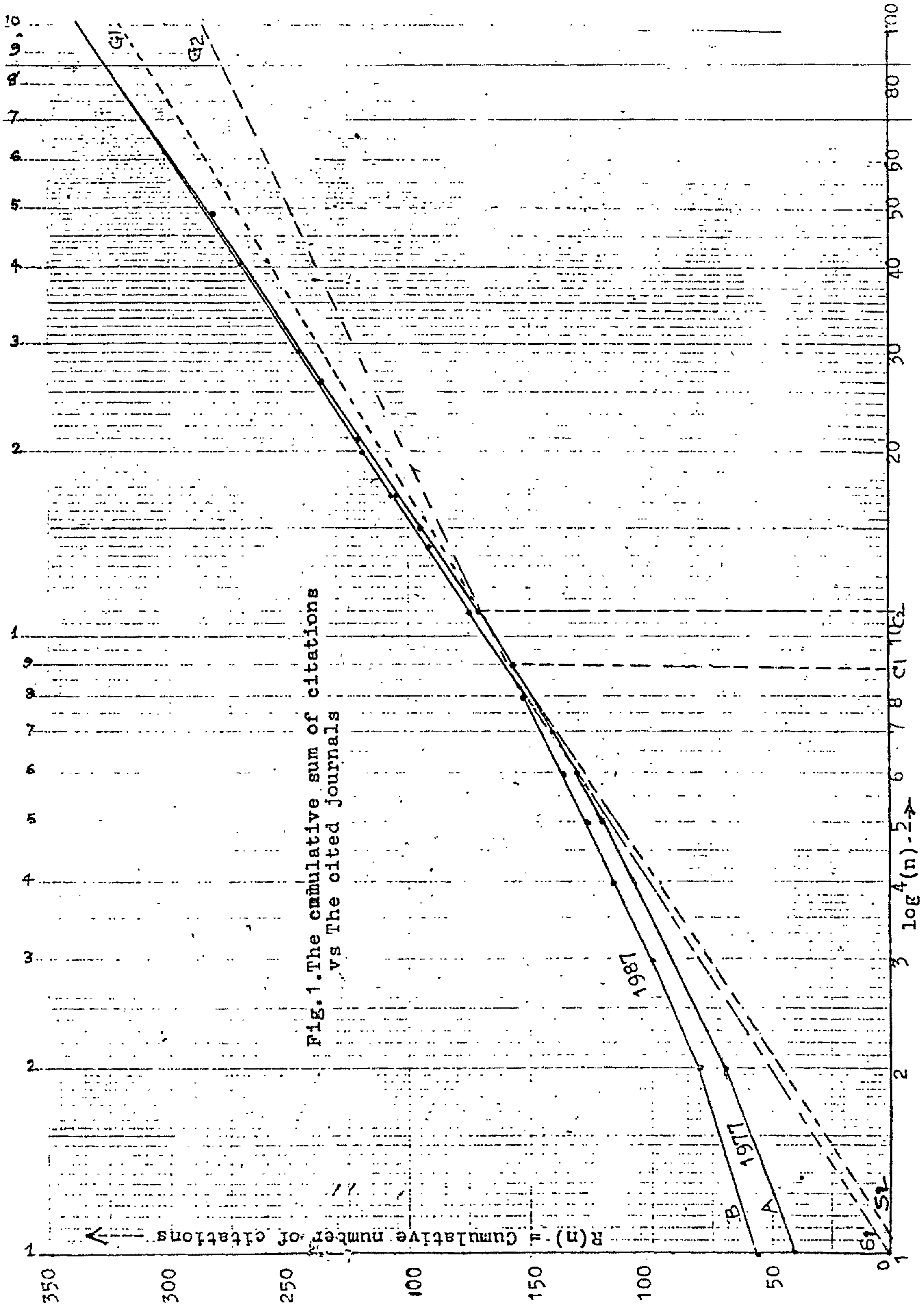

Fig. 1. The cumulative sum of citations vs The cited journals

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STOCK EVALUATION AND USER NEEDS

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The study shows how the selection of core journals could be made from the requests made by the users. It also gives in detail the mode of meeting the requirements of the staff and the students in the university library under different conditions. Areas of low use of the library are indicated and further investigations in that area are suggested.

INTRODUCTION

The problem of 'who selects' the reading material for the library has given way to a more acute problem of 'what to select'. It is a well known fact that the number of journal titles, especially in the field of science, increase proportionately with knowledge. To keep the scientist abreast of new knowledge in a given field it is essential to acquire most of the publications in that field. This is constrained by factors like limitations in funds and foreign exchange. Therefore a librarian faces a number of problems in building a good collection in the library.

As a result of the current economic situation in Nigeria, the question of what constitutes the core journals has posed a serious problem to the Nigerian librarians, especially to those attached to the institutions of higher learning. The economic measures adopted by the Nigerian Government in 1982 made it unusally difficult for the librarians to acquire optimum number of relevant materials in the library. The acquisition of books and periodicals in the library was affected most by the foreign exchange problem in the country. The problem of acquisition of books could be solved to some extent because they were to be purchased locally from book sellers and did not involve any foreign exchange.

Onadiran and Onadiran [1] discovered that the bulk of the library material in the university libraries in Nigeria was acquired from foreign countries like United States, Britain and Western Europe and hence, required a big amount of foreign exchange. Various other reports on collection development have also revealed that not only the funds, but the lack of foreign exchange was also a big constraint in building up a collection of periodical literature. Obiagwu [2] also described how difficult it was to make foreign exchange available for purcahse of books and periodicals. The only option left for the librarians in such cases is to discontinue the subscription of a number of journals.

The recent move of the Federal Government emphasizing on building up the stock of the libraries, offers help to the university libraries to acquire more number of books and journals. This aid from the federal government is available only for three years and if the acquisition of uncontrolable number of journals is started now, their continuation in due course, when the aid stops, may not be possible. In view of this a ranked list of journals according to their use was thought to be of immense help while discontinuing some of them. Such a list can be relied upon for selection of journals to be continued for subscription.

Therefore, a survey was carried out for the science journals in the science section of the University of Port Harcourt (UNIPORT) library to evolve a list of most used journals.

OBJECTIVES

The aim of this study is to identify the most used science journals at the University of Port Harcourt library. This would be a list of core journals for the departments in the faculty of science. The study is also aimed to identify the departments which make comparatively less use of research material and the reasons for it.

LITERATURE REVIEW

Many people have written on collection development in libraries and compilation of lists of journals relevant to the interests of the users. Bolgiano et. al [3] Guyatt [4 & 5], Guya and Mosher [6] studied the problems associated with selection of journals and made some observations on users co-operation in this process. It was established in the above studies that the library has to support research on a number of disciplines to a satisfactory level by its collection of monographs, periodicals, etc. Solutions were also proposed on how to arrive at a concrete and accurate information guide for making decision on continuation/discontinuation of subscription to some of the journals.

McElroy [7] and Sandison [8] had defined the adequate stock to fulfil the requirements. The former analysed the stock in the departments and its users and found that the stock was used more by the senior staff. While the later calculated "uses per-issue-per-day" by "dividing the total number of users by the total for all available issues of the number of days each had been on the shelf when the library was open and ranked the lists according to their number of uses". To make such stock reliable it must have been arrived at after evaluation for several months. The use of questionnaire was also reported by Roger [9] and Van Styvendaele [10] for assessment of the requirements of scholars.

The method of survey employed in this study was based on the lists provided by students and the lecturers of various departments in the university. Guyatt [4] used lists of publications by researchers, while Dhawan et al, [11] listed the titles of journals from primary and secondary sources of literature and compared them with the journals available in the library. Bolgiano [3] used citations in theses for compilation of a working list for acquisition of periodicals in the library.

UNIPORT LIBRARY SCENARIO

As stated earlier, this study is based on the stock available at UNIPORT Library. The main library formerly held journals for all departments but now with the expectation of setting up faculty libraries at different places in due course, the holdings of the main library would be divided into the faculty libraries for the following subject groups:

- Pure and Applied Science comprising science, engineering and medicine.
- Human Science comprising humanities, social sciences and management science.
- Education.

There was a break in acquisition of books and journals as reported by Obiagwu [12] in the university library and a significant number of journals were discontinued. Now with the provision of a loan from the World Bank for stock building in the library, the acquisition of journals may be increased. Simultaneously, caution has to be taken regarding the number of journals to be subscribed because the loan is available only for three years and the subscription to some of the journals may have to be stopped at the end of three years. Therefore, an attempt is made to prepare a list of core periodicals which may help the librarian to decide whether to continue/discontinue a particular title.

METHODOLOGY

The disciplines that make up the faculty of science were assigned classmarks according to the Library of Congress Classification [13] Scheme. Publications in biochemistry are scattered under QH - biology, QD - chemistry and QP - physiology depending on the orientation and inclination of the contents. Therefore, a separate classmark for biochemistry is not used as shown in Table 1 which also gives the total number of journals in each subject.

The journal or the research section of the library has open access system for the lecturers who are allowed to enter the library at any time within its working hours. Therefore, it is not easy to calculate the frequency at which they used the library. To study the use of library materials by the lecturers, they were asked to send a list of journals they would like the library either to retain or to add to the existing collection. The lists submitted by them were compared with the journal titles, already available in the library and a masterlist was prepared. The master list generated from the requisitions from each department was circulated to the lecturers with a request to tick the titles they have consulted in the library.

Table 1

Subject Distribution of Journals

Subject	Library of Congress Classmark	No. of Journals held under theClassmark
Agriculture	S	53
Biochemistry	-	16
Botany	QK	29
Chemistry	QD	84
Geology	QE	36
Mathematics/Statistics/ Computer Sciences	QA	99
Microbiology	QR	26
Physics	QC	50
Zoology	QL	51
Science (General)	Q	45
Physiology	QP	27
Biology	QH	89
Astronomy	QB	6
		611

Due to lack of sufficient reading space and staff in the library, the student users from the faculty of science are allowed to use the library only on Mondays and Tuesdays. They are not given free access. They request for assistance at the service desk. Catalogue of the research materials is maintained in the rotatory index, card catalogue and compilations in booklets.

The users go through these sources and enter the details of the required document on a request slip and hand this slip over to the library assistant. A specimen of the slip is shown in Fig. 1.

Fig. 1

UNIPORT LIBRARY

Request Slip

Author: --

Title: --

Call No: ------------------------ Acc. No: ------------------

Vol. No: ------------------------ Years: ------------------

Requested by: --

Mat. No: ------------------------ Dept: ------------------

When more than one document are required at a time, the user makes use of the back of the slip. The required material is retrieved, the user's identity card is attached to the request slip and kept for records. The identity card is returned when the material is returned. At the close of the day the slips are counted, recorded and stored.

The request slips formed the basis for study of use of the stock by the students. The request slips of the students in the faculty of science were first sorted out. From this was calculated the number of users and the number of titles consulted per month.

Further, these slips were sorted into various departments and a list of the titles requested by the students in each department was produced. Classmark was assigned to each item listed. Journals having a classmark that corresponds to the one assigned to any of the departments in Table 1 were counted. These were considered as requests from within the department. The request slips belonging to other classmarks were the requests from outside the department. The material not possessed by the library or entered wrongly by users with incorrect details were sorted out from the lists.

Students and lecturers from the departments that showed low use of the research library were interviewed personally to find out the reasons for poor use of the library by them.

Further, to confirm the validity of this computed list, the citation of these titles in the dissertations of earlier students was studied. Five theses/dissertation from each department were selected and crosschecked for citation of these titles.

RESULTS AND FINDINGS

With reference to Table 1, out of the total stock of 611 journals, the science library has maximum stock in mathematics, statistics and computer science (99 titles) followed by biology (89 titles) and least in astronomy (6 titles). By physical examination of the journals, it was discovered that 16 titles in biochemistry were classified under QH - biology, QD - chemistry and QP - physiology according to the subject content.

It was easy to study the use of library stock by students because of the tangible records on slips provided. It was not easy to eliminate the element of bias appearing in the manner in which the lecturers ticked the journals they had used. The journals ticked by a lecturer were taken as core journals in that area. It is interest-

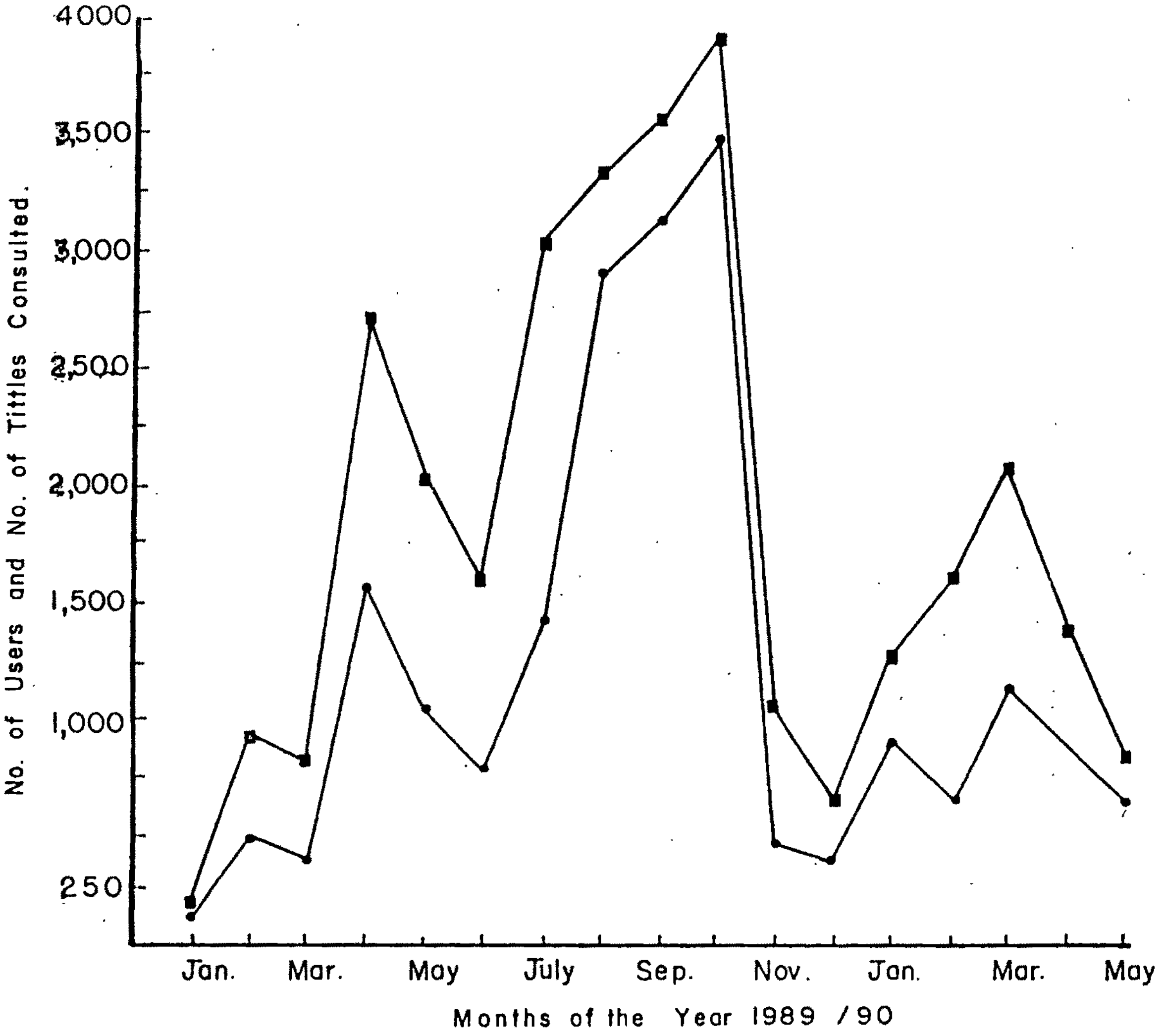

Fig. 2 : NUMBER OF USERS AND NUMBER OF TITLES CONSULTED WITHIN THE SURVEY PERIOD Jan. 1989 - May 1990.

●——● No. of Users ■——■ No. of Tittles Consulted

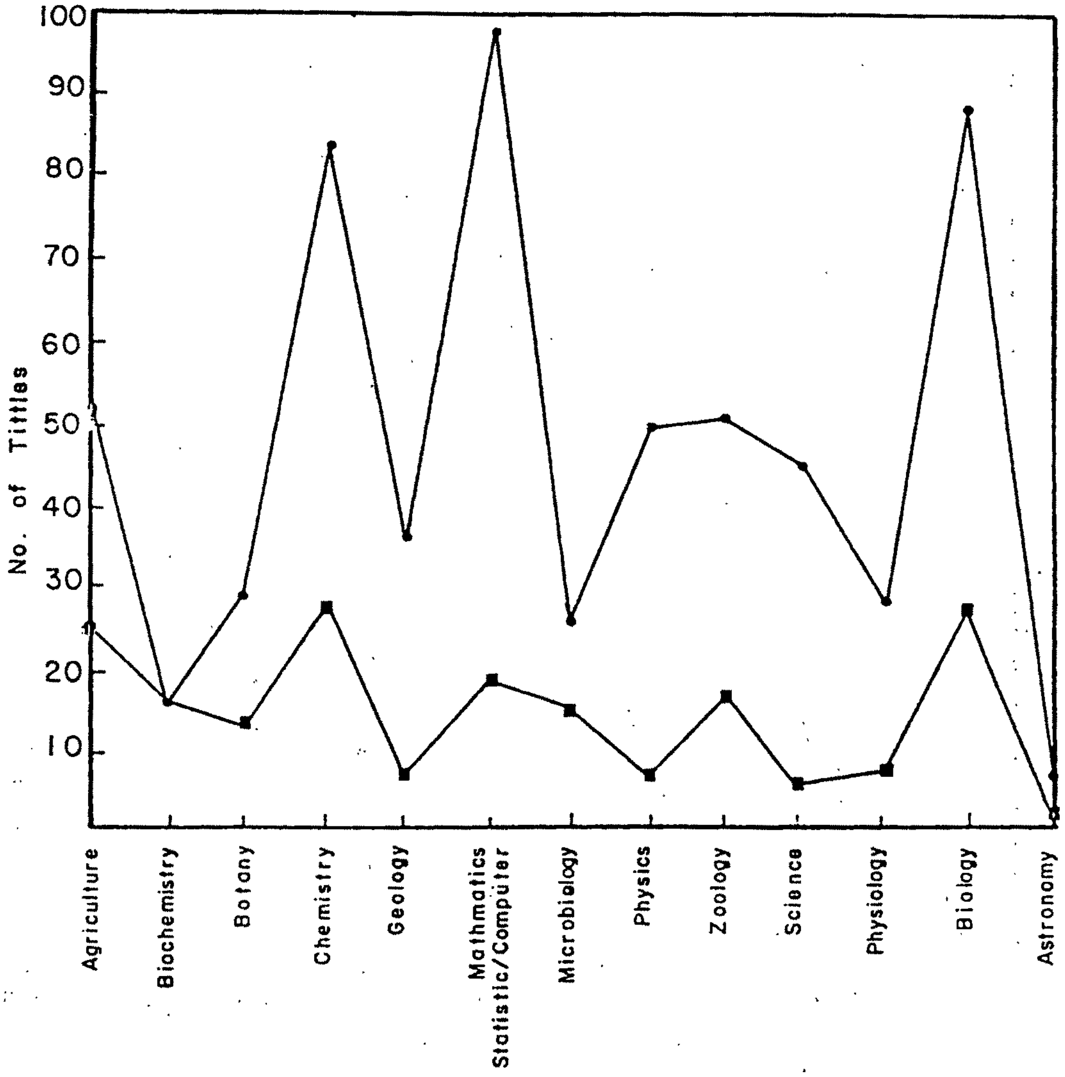

Fig.3: USEFUL PORTION OF THE STOCK COMPARED WITH THE TOTAL STOCK IN EACH SUBJECT.

●——● Journals Held in the Subject

■——■ Usable No. in each Subject that Form the Core.

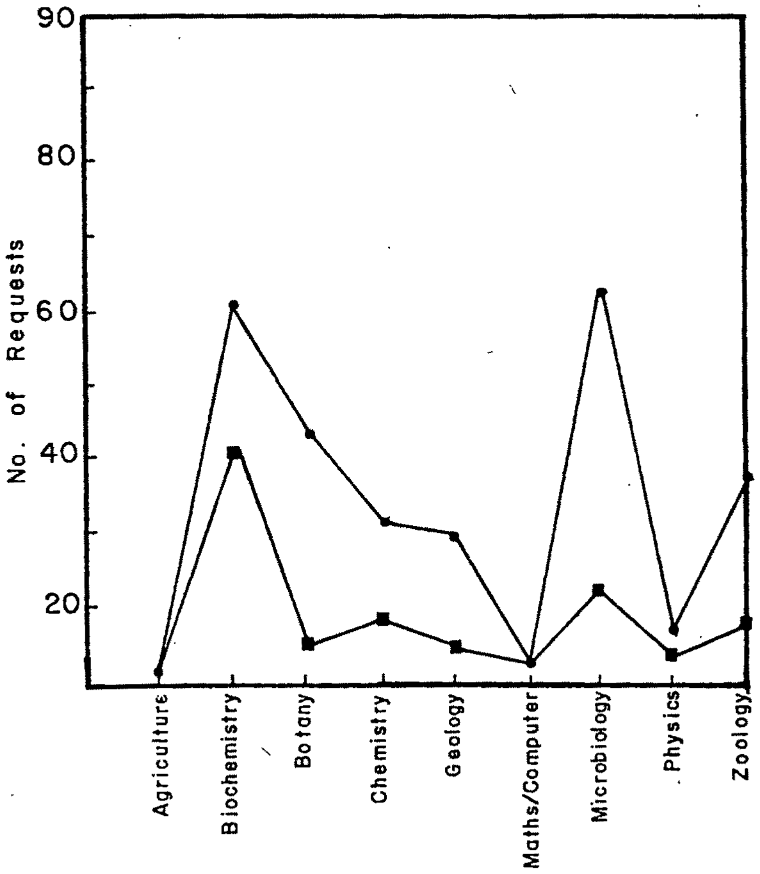

Fig.4: REQUEST SATISFIED WITH JOURNALS IN THE SUBJECT CLASSMARK AND THOSE FROM OTHER SUBJECT CLASSMARK.

●——● Requests Satisfied from Department Classmark

■——■ Requests taken from other Department Classmark ing to note that all titles on a field available in the library were not consulted by the lecturers in that field.

The design of the request slip made it easy to differentiate the slips used by the students from those used by the members of the faculty of science. Users could request for as many titles as they wished. Fig. 2 shows the number of users and the number of titles they consulted during the period January 1989 to May 1990. The highest number of users were recorded to use the library during August and October 1989. This is the period of long vacation and the long vacation students outnumber the regular students. Their demand is equally higher as shown by the number of titles they consulted. The regular students were in session during January to July 1989, November to December 1989 and January to May 1990. April 1989 was the period when the students were writing their term papers and dissertations. Within this period, they made regular use of the library. The demand during April to May 1990 witnessed a decline as compared to that of the previous year. This is because the students were on strike during this period in 1990 and the lecturers were suspended.

The total number of journals possessed by the library in each course is shown in Fig. 3 which Also displays the number of journals that are found to be used by the staff and the students (the core journals). All the titles in biochemistry are found to be useful as core collection. The number of core journals are less than the total number of journals in each course. This confirms the findings that only a few titles serve the information needs of most of the users of the library in each course and falls, roughly, in line with Bradford's Law. Within the suvey period, no user requested for any title in astronomy.

The relative display of the requests met with by the journals in the same classmark and outside it is given in fig. 4. Microbiology has the highest number of requests satisfied by the journals from within the classmark. The use of outside stock by microbiology department is equally high. Mathematics and physics department made low use of the stock within their department's classmark. This area of poor use of the library necessitated further research to discover why the demands of these departments were low. The result of the interview with the lecturers and students in mathematics department showed that there were no graduate students in the department, and the undergraduate students make more use of textbooks than journals. The graduate students in physics department also showed low use of research materials because of the facility of having the books and journals in their departmental book store (not a library). They were also found to make use of other sources like the stock of their lecturers. However, they found the library book collection useful in their seminars.

It is to be noted that Agriculture is not a teaching course in this institution. It is only for research. Also there is no department of astronomy, physiology, biology or pure science. The stock in these areas were heavily used by the students and lecturers in other departments in the faculty of science. For instance, number of requests on Agriculture classmark were made by users from other departments. Requests for the journals in fisheries were made from the department of Zoology and those for the journals in crop science were made from Botany department.

When the titles in the generated list were cross-checked with the references made by the students in the theses and dissertations at least ten titles available in the departments were found listed in them.

The final list which emanated from this study consisted of journals that were:

a) Recommended by the lecturers for acquisition/continuation;
b) Used by the lecturers;
c) Requested by the students;
d) Cited in theses/dissertations of former students.

CONCLUSION

The investigation enabled the compilation of the list of the most used as well as that of the least used journals. It can be used for making the decision about continuation or discontinuation of subscription. It also highlights the importance of the statistics maintained on user's requests. The departments that make low use of the library have been identified. Further study could be carried out to find how best the science library can provide services to its users.

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CURRENT TECHNOLOGY IN THE LIBRARY - LOCAL AREA NETWORKS (LANS)

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Over the past few years, the development of Local Area Networks (LANs) has been rapidly advancing and is expected to remain so in the future also. The purpose of this article is to define LAN, state briefly its characteristics, position and classification. The four main technological aspects essential for LANs, viz. transmission medium, topology, transmission technology and access control method are dealt with in detail. Finally, the importance of application of LANs in libraries is described.

INTRODUCTION

While making a systematic transition into the Information Age, libraries have to adopt special techniques to superimpose modern information service upon the traditional functions. The technological revolution has already brought about many drastic changes in the libraries and it will continue to change the nature of the libraries. The President of EDUCOM stated that "one of the grand challenges for technology in the coming decades is to create an electronic network linking every scholar in the world to every other scholar and so establish a knowledge management system in this world -----. The network will eliminate the isolation of scholars at small and remote institutions, encourage collaboration, speed up technology transfer, and enhance research productivity by reducing the time needed to obtain and exchange information" [1].

Recent developments in networking, and the integration of word processing and facsimile lead to the evolution of the concept of Local Area Network. During the past few years coalition of the Government Organizations, library and information centres, institutions and private companies lead to the discussions on promoting Local Area Networks (LANs) to meet the needs of scholars, researchers and information seekers.

The British Library has installed LANs and the first step towards its implementation was taken in Autumn 1988. Norman Moir, the British Library's telecommunications manager observes that he is fairly impressed with the LANs and says "We 've had little trouble, they' re easy to install and easy to maintain. The main thing is that the users are happy" [2].

The computer industry has grown rapidly in a very short span of time. With the advent of personal computers (PCs), a large number of organisations have adopted the use of computers.

The estimated growth in worldwide PC usage is increasing constantly (Fig.1).

When a large number of computers are used. It is natural that the users like to interconnect with each other in order to exchange data and share the resources avoiding duplication of expertise and effort. Local Area Networking is basically a transmission system for linking computers over a restricted geographical area. It is a combination of cables/connectors, computers, processors and interface software which interconnects computers and related devices. It regulates the flow of information traffic among these devices.

DEFINITION

R.M. Metcalfe [3] defines the term 'Local Area Network' as "a digital communication facility carrying data at high speed among a large number of

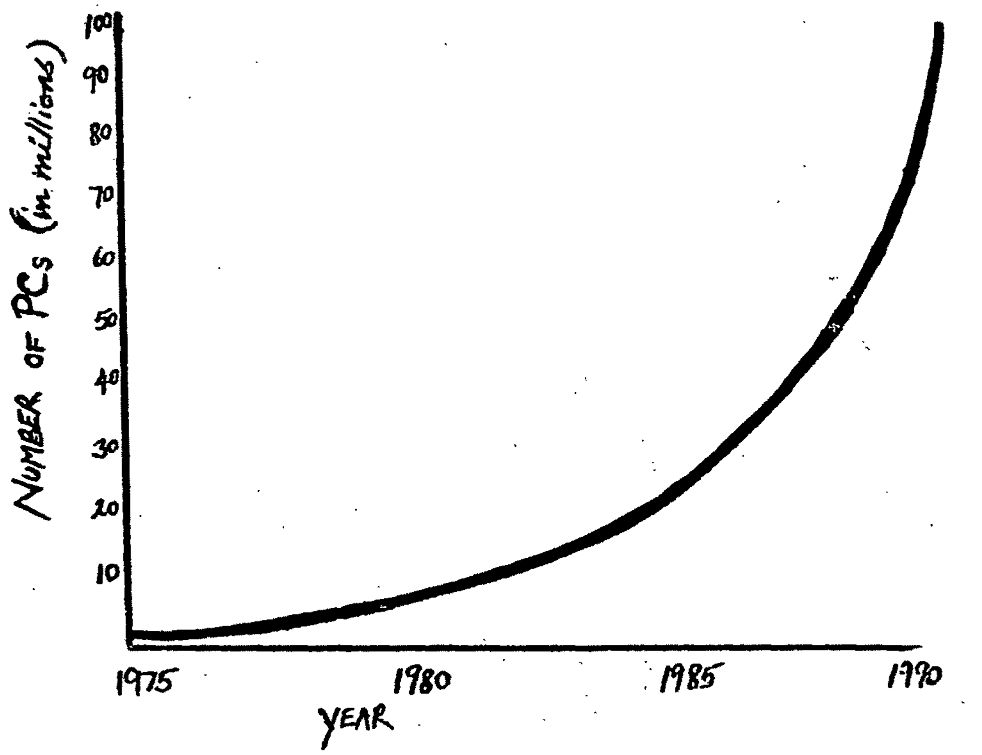

Fig 1

information processors directly interconnected within a building or in adjacent buildings".

The Institution of Electrical and Electronic Engineers 802 Local Area Network draft standard [4] describes LAN as "A Local Network is distinguished from other types of data networks in that the communications is usually confined to a moderate size geographic area such as a single office building, a ware-house or a campus. The network can depend on a communication channel of moderate to high data rate which has a consistently low error rate. The network is owned and used by a single organisation. This is in contrast to long distance networks which interconnect facilities in different parts of the country or are used as a public utility. The Local Network is also different from the networks which interconnect devices on a desktop or components within a single piece of equipment".

Looking more towards the user end, Kenyon [5] says that a Local Area Network is "an organised collection of users and services".

CHARACTERISTICS OF LOCAL AREA NETWORKS

a) It links different types of computers - micro, mini and mainframe.
b) It maximises local control. The area covered ranges from a few metres to a few kilometeres.
c) It avoids degradation of performance.
d) It facilitates distributed processing. In practice, many of the smaller LANs operate on a master and slave basis, with slave PCs clustered round a master shared filestore.
e) It avoids problems arising out of network traffic.
f) It helps to share resources like mass storage devices, printers, plotters, etc.
g) It reduces dependence on a central system.
h) It has low error rates.
i) It has a high potential of hardware resilience which reduces the effects of system failure. Failure of one CPU will not affect the other.

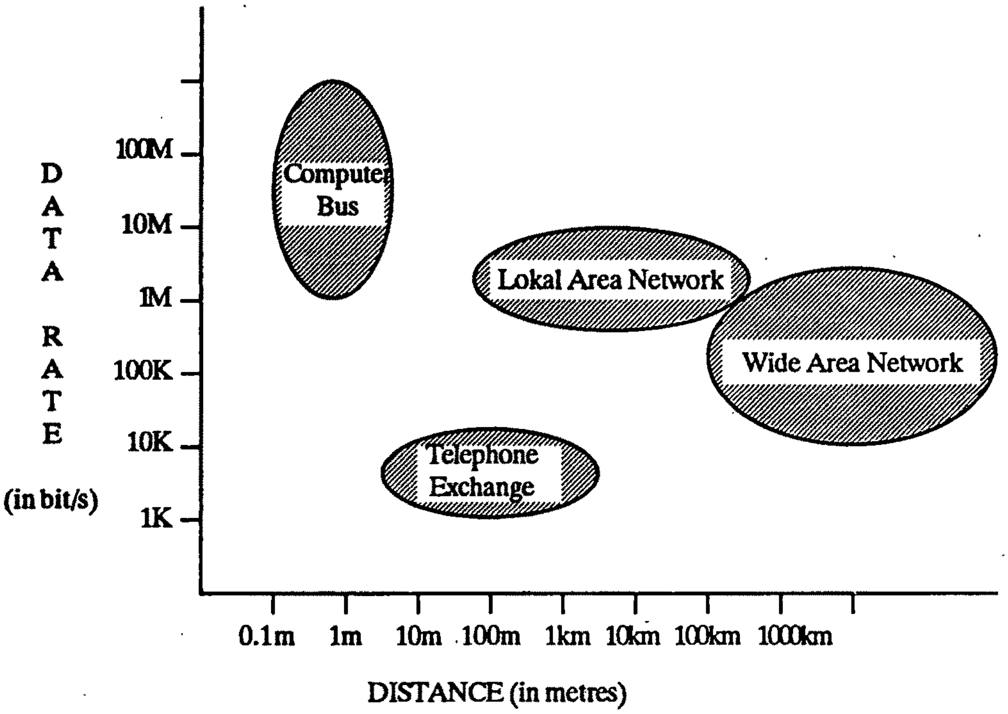

Fig. 2 : Position of Lans

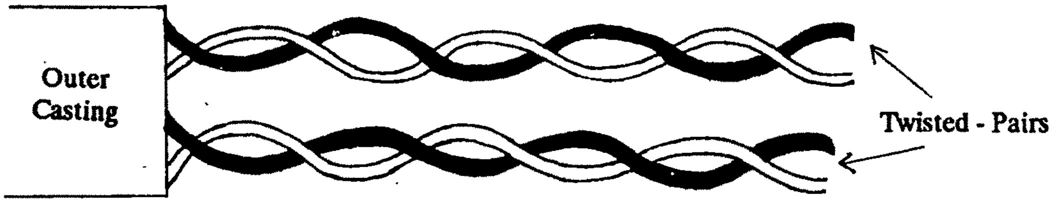

Fig. 3 : Twisted Pair Cable

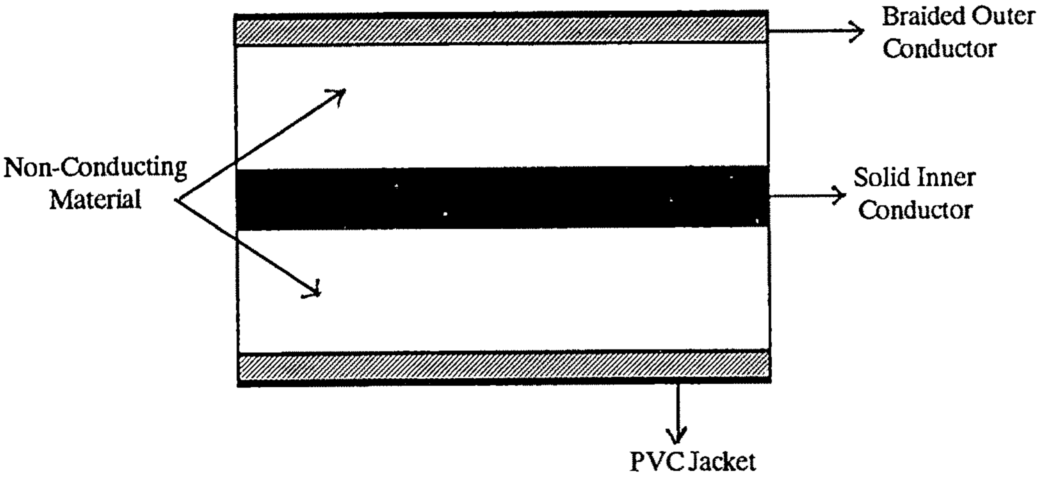

Fig. 4 : Coaxial Cable

j) It integrates specialised work stations for activities like CAD, CAM, CIM and word processing etc.
k) It helps to implement online applications including library services. Speed is very high.
l) Relatively inexpansive methods are used to get connected to the network.

Not each and every Local Area Network would have all these characteristics, but fundamentally these are the major characteristics found in any implementation.

POSITION OF LANs

The raw data transmission rate of LANs is high as compared to the ordinary telecommunication circuits. Figure 2 indicates the position of LANs relative to other forms of data networking.

CLASSIFICATION OF LOCAL AREA NETWORKS

The basic concept of all computer networks is the switching of information from one station to another. A station is any system which can communicate, and the nodes are the devices which enable communication to occur. The four main technological aspects, namely Transmission medium, Topology, Transmission technology and Access control method serve as a convenient classification of LANs.

Transmission Medium

Transmission medium denotes the nature of the physical path along which the data must travel. The three main media used in LANs are; twisted pair cable, coaxial cable and fibre optic cable.

Twisted Pair Cable: This is the most common transmission medium used for the telephone network to link each hand set to its local exchange. It is suitable for limited distances and it is the cheapest of the three media. It is easy to install and is being used very successfully in LANs especially in Cambridge Ring networks which is a Local Area Network project at the University of Cambridge. IBM has also standardised on twisted pair cabling system. It has the capacity to carry data upto 16 Mbits/

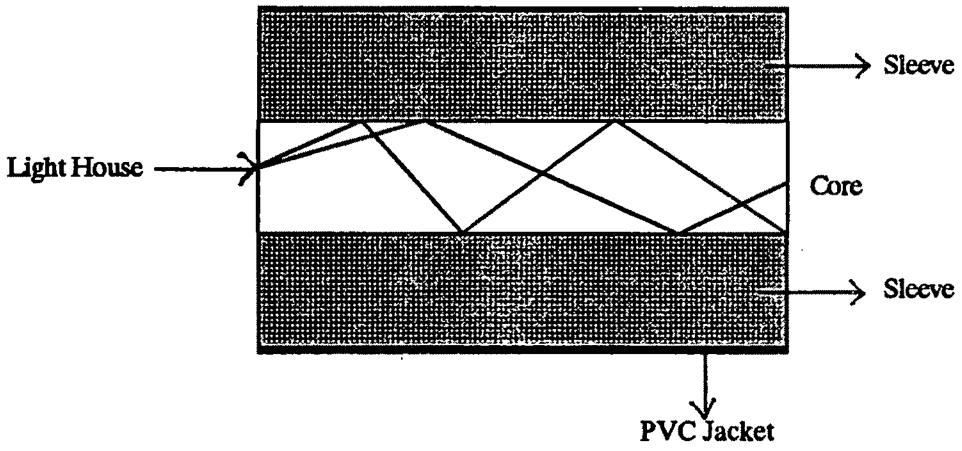

Fig. 5 : Fibre Optic Cable

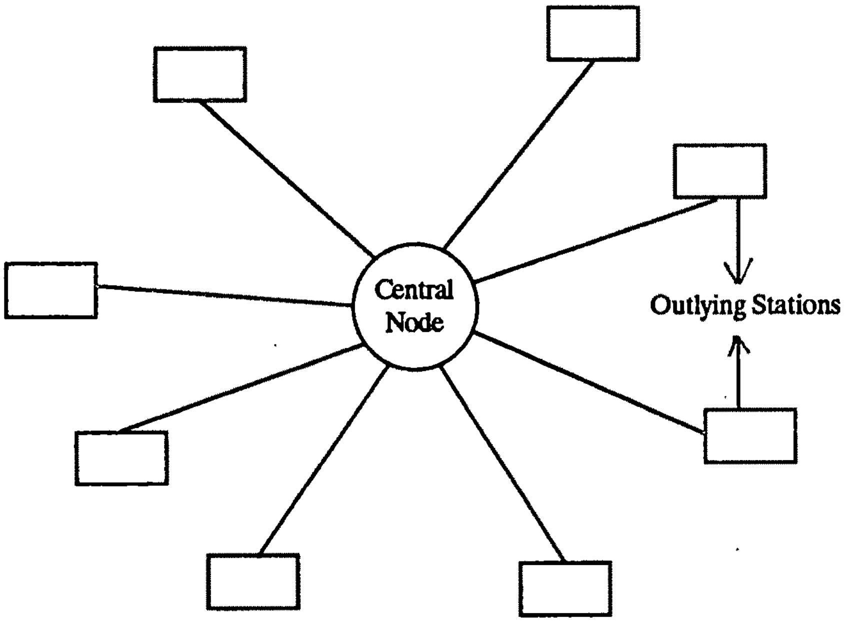

Fig. 6 : Star Topology

s. Each circuit requires two insulated wires usually made of copper and twisted in a helical pattern as in Figure 3.

Coaxial Cable: This is the most versatile and popular medium of LANs, since it offers high speeds over moderate distances at moderate prices. Like twisted pairs, coaxial cable comprises two wires but its design of a single inner conductor and a hollow outer conductor as shown in Figure 4 with insulating material in-between enables it to have higher bandwidth and work at higher data rates than twisted pair. Bandwidth is the width of the frequency band that can be handled efficiently by the system and it is also a measure of the transmission speed..

Fibre optic cable: It consists of a very thin, flexible, glass or plastic strand, through which light can be transmitted by reflection off the tube's internal walls as shown in Figure 5.

Fibre optic cable can operate with much greater speeds and distances than coaxial cable and has the lowest error rate. It requires the conversion of electrical signals from a station into light signals which is done by a light source namely Light-Emitting Diode (LED) and Injection Lazer Diode (ILD). LEDs are much cheaper than lazer devices.

Topology

The topology of a network is the shape of the communication link between the stations, i.e how the stations on the network are arranged in relation to each other. The four basic topologies used in LANs are star, ring, bus and tree.

Star topology: In this topology, as in figure 6 each station is connected to a central switch on a central node by a dedicated physical link. The access to the network or a station in the network is under the control of central node.

Ring topology: A ring network as shown in Figure 7 is one where the stations are connected by a loop of cable, and each connection point, called a repeater, is responsible for passing on fragments of the data. The data is sent in packets, and within each station there is a controller board responsible for recognising packets addressed to a station and for deciding to start transmitting the data when it is clear. IBM has choosen the token passing ring as their preferred LAN product.

Ring can overcome some of the distance limitations between stations.

Bus topology: Bus networks are the most common LANs, because about 50% of them are based on this topology. It does not have switches and repeaters, but simply share a common linear communication medium as shown in Figure 8.

Each station must have a tap, i.e. a hardware for attachment to the medium which must be capable of delivering the signal to all the stations on the bus. The most significant bus network is Ethernet, invented by Xerox Palo Alto Research Centre in 1975. It is now adopted as an international standard with readily available interfaces. It is attractive because it is available either as a baseband or a broadband LAN which is explained in detail under the heading "Transmission Technology".

Tree topology: The tree network is a generalisation of the bus topology where the cable is made to branch down many side shoots by the use of a cable splitting device as shown in Figure 9. Each transmission propagates down each branch of the tree to all stations.

Transmission Technology

Transmission of the data means how the bits themselves are sent across whatever medium has been chosen. There are two types of transmission, namely Baseband networks and Broadband networks.

Baseband networks: Baseband means that the original signal is transmitted without modulation, i.e. at its original frequency. For LANs, baseband means that digital signalling is used where the whole bandwidth of the medium is used to carry one single transmission. In this, only one information channel can be handled on the medium at any one time. This network has simple topology and it is relatively cheaper to use for linking a moderate number of stations.

Broadband networks: Broadband networks use modulated analogue signals called carrier signals to transmit data over a wide range of frequencies

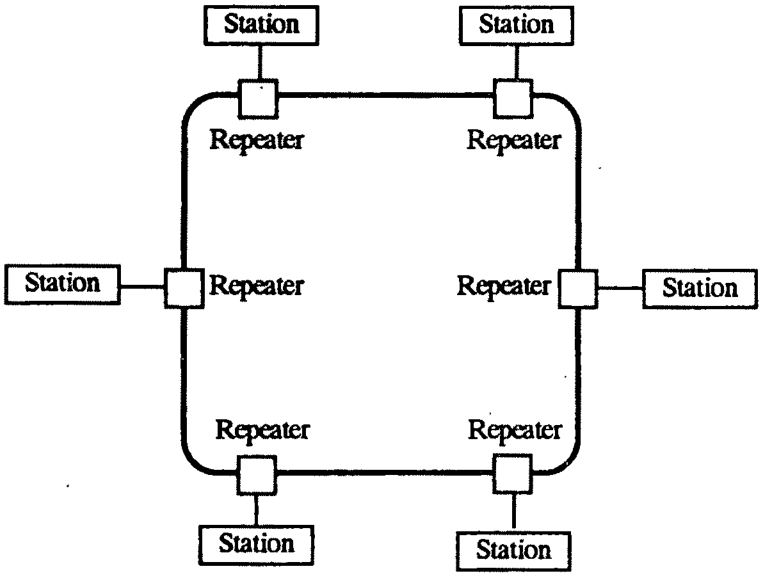

Fig. 7 : Ring Topology

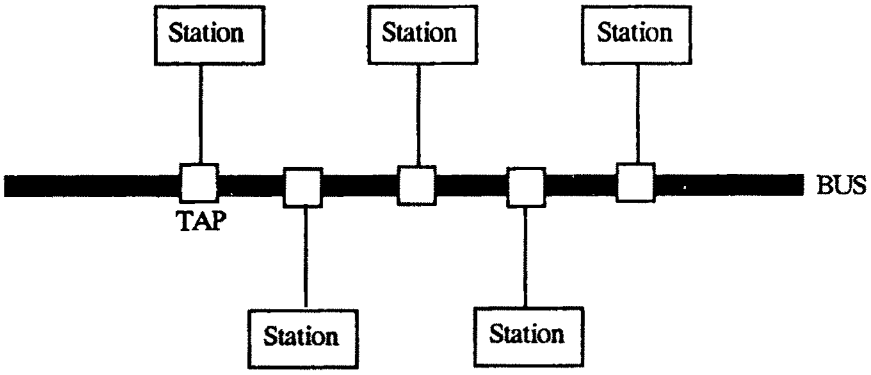

Fig. 8 : Bus Topology

normally up to 300 or 400 MHz. The total frequency of the medium is divided into a number of narrower bands or channels and each channel is used independently to provide a range of services. Thus this network can support many thousands of terminals and host computers. Another advantage of broadband network is that channels can also be assigned for analogue data, including television, voice, facsimile and security systems. Modems are essential at each station to modulate and demodulate the digital signal into the carrier signals. Broadband network normally use a tree topology as shown in Figure 10.

This network is ideal for campus networks and large factory complexes.

Access Control Method

This is a method to control the flow of data between the stations in a LAN. This is related to the topology of the LAN, and some techniques like Polling, Carrier Sense Multiple Access (CSMA), Token Passing and Slotted ring can be imposed on different topologies.

Polling: This technique relies on a master-slave relationship between a central server and the other stations on the LAN. It was developed for star topologies, but also used in other topologies. The central server maintains a list of the stations assigned to share its disc space. When there is a transmission to make, the station is permitted to send one or more packets to the central station. The station must then wait until it is polled again before it can send any more. This technique depends heavily on the reliability of the central server and it is very simple to implement. It is, therefore, more used for small scale networks where transactions are expected to be low.

Carrier Sense Multiple Access (CSMA): This technique is commonly used in LANs. It is restricted to bus and tree topologies. There is no polling from a central station, but all the sections have equal priority and has multiple access, i.e. all the stations share the same physical medium, or the same channel in a broadband system. A station must listen to the medium to find out if it is idle or not before starting its own transmission, so the name carrier sensing. The problem with this method is that two stations could decide to transmit simultaneously. To overcome this CSMA with Collision Detection (CSMA/CD) and CSMA with Collision Avoidance (CSMA/CA) are commonly used.

Token passing: This is a form of distributed polling where a single poll or a token permanently circulates around the stations in some sequence. It is applicable to both ring and bus topologies. In a token ring access, the token rotates round the ring. This technique is used in the IBM and IEEE 802.5 token rings. In a token bus access, the token passing is similar in operation to that on a ring but the flow of control from station to station is not automatic, and the stations have to be organised into a logical ring sequence.

Slotted ring: This technique is commonly known as Cambridge ring, since it was developed as a working system in the Computer Laboratory of the University of Cambridge. This is a technique for access to a ring whereby an empty packet, or slot is continuously circulating round the stations. A station may fill the slot when it is received. It is capable of high transmission speeds.

APPLICATION OF LOCAL AREA NETWORKS IN LIBRARIES

In Library and Information Science, the integration of library applications have been the watchword of its development. Special libraries and information centres are heavily committed to information retrieval facilities, whereas academic libraries and public libraries are still getting under way.

Local Area Network is fundamentally involved with the structure of information-based activities. Management benefits of flexibility and expandability characteristics of LAN are very essential for library services. Many library work like data entry, word processing can be economically done under local control at a work station. Local Area Networks help to share resources such as data in hard disks/ CD ROMs/ optical disks. The sudden proliferation of microcomputers and microcomputer networks is presenting more and more libraries with the challenge of data-processing management [6]. Large libraries which are in a position to utilize computer facilities, i.e. have a mainframe or minicomputer installation may be networked to other facilities

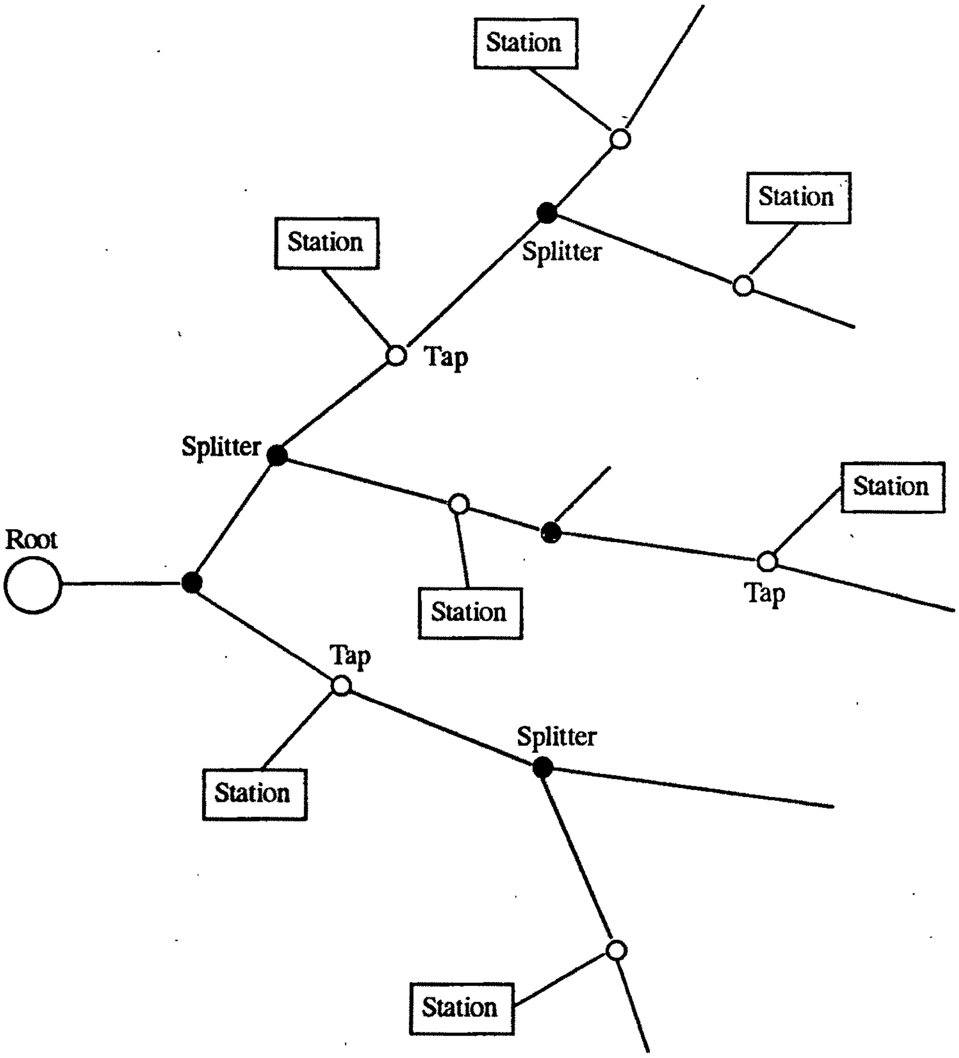

Fig. 9 : Tree Topology

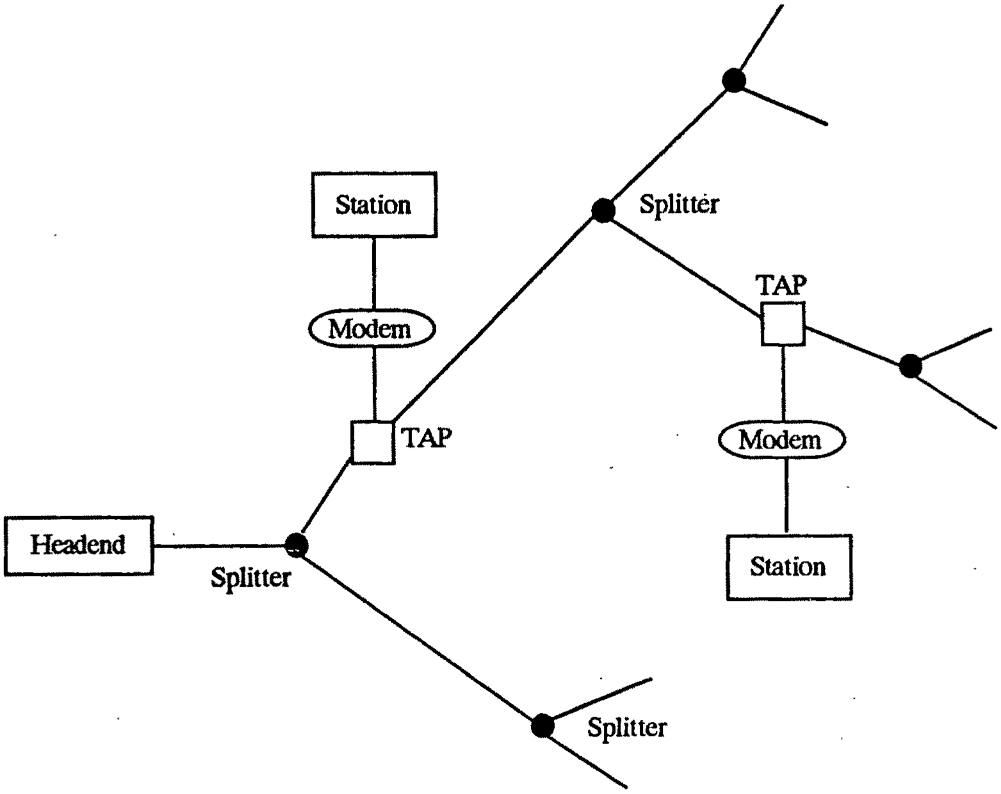

Fig. 10 : Broadband Network

within the organisation. Gateways to remote databases can be provided which allow access from different points outside the physical locality of the library.

Housekeeping applications like cataloguing, circulation, acquisition, periodical control, word processing, management of information and financial control are all feasible. In addition to this, LAN can be used for a more essential and important service, i.e. readers service apart from the technical services mentioned above.

Information services to readers like retrieval of primary and secondary sources, databases, current awareness services (CAS), selective dissemination of information (SDI), computer assisted learning, user education packages are all feasible. Neil Maclean [7] has explained this as "Access is potentially an uncontrollable resource in a Local Area Network". If a library computer system consists of one large microcomputer for circulation control with its own database, another for catalog maintenance, yet another for online patron access catalog, then with the proper LAN software, any terminal can use any computer as required. Thus a group of separate computers and databases can form an integrated system through use of a LAN.

CONCLUSION

Computer networks are expected to play an increasingly important role in the libraries and Local Area Networks will play a major part in the development of networks. Local Area Networks in libraries provide the future prospect of entering into new information technology at lower cost but at a clear development pathway. LAN will have an increasingly important role in producing effective library and Information systems within and between the organisations. The future library system should be a Local Area Network with microcomputer work stations for housekeeping or technical services, reader services, shared file storage, shared printing facilities and shared storage of databases. This results in closely integrated library services leading to greater accessibility for the community it serves. Making full and effective use of LAN requires a new parthership among libraries, computer technology and concerned authorities. Technology is going to remain the driving force by creating new opportunities for the expansion and improvement in library and information services. It would be appropriate to conclude with the words of Mr. Jakob Van Heijst [8]," Director of United Nation's Dag Hammarskjold Library that in this day and age, having books or other material available on the premises is no longer the primary function of a library. Now-a-days, the ability to locate the needed information, with the aid of the most modern technologies, is considered most important" and it is in this context that LANs come to play their vital role.

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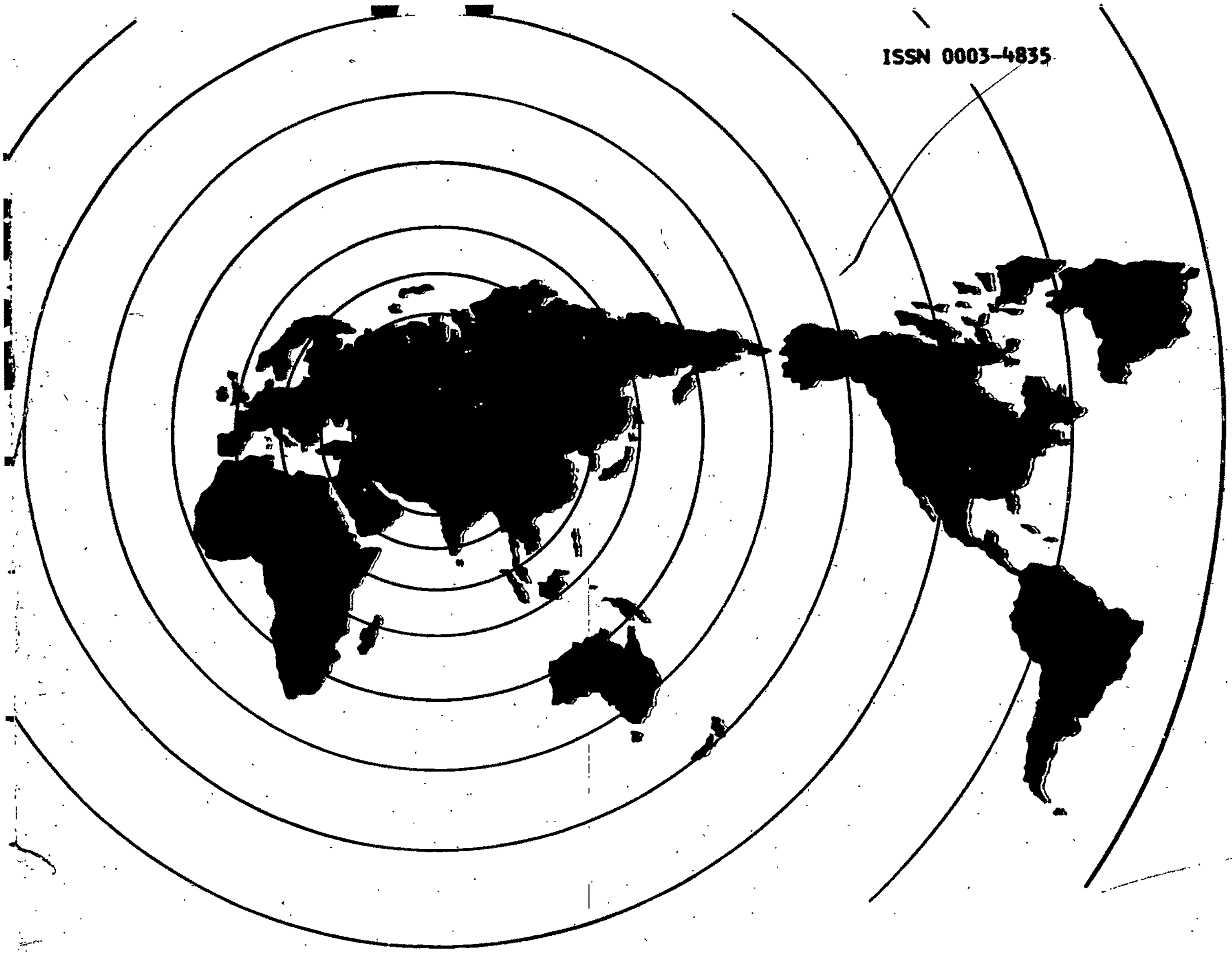

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PROCEEDINGS OF THE OFFSHORE TECHNOLOGY CONFERENCE - A QUANTITATIVE AND QUALITATIVE ASSESSMENT

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The Proceedings of the Offshore Technology Conference (OTC) has been evaluated for its status. It is found that there are very few core journals devoted to offshore technology alone. OTC Proceedings considered with these journals is found to rank fourth on the basis of its impact factor. The OTC Proceeding is also tested for other parameters of qualitative aspects and found to be of reasonable standard. On the basis of this it is suggested that publications in OTC Proceedings be considered at par with the journal articles.

INTRODUCTION

Making a qualitative assessment of publications is a very difficult task [6] and there is no thumb rule yet to say which kind of paper will make substantial contributions to a field of study. One of the suggested ways to weigh a paper is the standard of the journal itself in which it appears [3].

The interviews of the university faculty members and administrators to find out the acceptable parameters for evaluation of research publications [1] revealed that publication of papers in prestigious journals is one of the most accepted parameters of evaluation.

The Council of Scientific and Industrial Research - the largest R & D establishment in India has been evaluating research output of its constituent laboratories on the basis of impact factor of the publications in which the articles emanating from them are published [2].

This has made the scientific community cautious in selecting journals for publishing their research papers. In doing so, a doubt arises in the minds of scientists as regard to the weightage given to a paper published in the conference proceedings because they are not considered at par with journals. The reason is that they do not, generally, undergo the process of refereeing system as in the case of journals. Even if this is considered as a valid argument for the time being, this is not the only criterion for weighing the standard of a publication. Even among the journals, various parameters [4] are taken into consideration to decide their ranking. Further, in some developing subjects, the number of journals are very few and hence, the scientists prefer to publish their papers in the conference proceedings. Keeping these in view, an attempt is made to evaluate the status of the Proceedings of the Offshore Technology Conference (OTC) and its ranking among relevant journals.

OFFSHORE TECHNOLOGY CONFERENCE

For more than two decades, professionals have chosen this conference as an outstanding annual forum for the dissemination of new technology related to offshore operations. The conference is sponsored by the following nine learned societies:

a) American Institute of Mining, Metallurgical & Petroleum Engineers,
b) American Association of Petroleum Geologists,
c) American Institute of Chemical Engineers.
d) American Society of Civil Engineers,
e) American Society of Mechanical Engineers,
f) Institute of Electrical & Electronic Engineers,
g) Marine Technology Society,
h) Society of Exploration of Geophysicists, and
i) Society of Naval Architects and Marine Engineers.

In recent past the proceedings has been publishing nearly 300 full length papers in four volumes every year. The scope of the proceedings cover the following:

a) Offshore geology and geophysics;
b) Offshore founded and floating/mobile structures;
c) Diving, salvage and repair operations;
d) Equipment, techniques and support services;
e) Minerals and energy resources; and other technological aspects such as fouling, corrosion, soil mechanics, hydrodynamics, etc.

The OTC has its own full time office at Texas (USA) and works on strict time schedules.

METHODOLOGY

The criteria used by the Science Citation Index (SCI) [2] has been applied to the Proceedings of the OTC for its evaluation. These are:

- Impact Factor (I F),
- Internationality,
- Timeliness/regularity,
- Use of international editorial conventions,
- Language,
- Peer reviewing,
- Editorial quality, and,
- Reputation of publishers.

The impact factors of the OTC Proceedings for 1989 and 1990 have been determined using the methodology suggested by Sen et al [7]. To evaluate OTC's standing in the subject, it was necessary to compare it with other relevant journals. All the journals cited in 292 papers of OTC proceedings of the year 1990 were considered as relevant and listed. Their impact factors were checked in the Journal Citation Reports (JCR) 1987.

The information on other different criteria has been collected from the Proceedings and the correspondance with the authors.

OBSERVATIONS

Citations and Impact Factor

Since it is beyond the scope of the SCI to count the citations to the conference proceedings, and there is no other ready made source to know such counts, the number of citations to OTC could not be ascertained. Therefore, the study depends on the citation counts from the OTC proceedings alone.

The citations from the Proceedings of the OTC of the years 1989 and 1990 to the previous two respective years were manually searched and noted to findout the Impact Factor (IF) (Table 1).

The total citations (2122) in the citing articles (292) of the year 1990 proceedings were analysed further. The journal citations count was only 20.8% as against the citations to other material (79.2%). Maclean al [5] have also noticed that the citations to journal articles among International Centre for Aquatic Living Resources Management (ICLARM) publications are comparatively less than other forms of literature. It is concluded from this phenomenon that the journal articles do not constitute the "core" literature in developing countries. With observations from this study, it could be further added that it is not only the developing countries but also the developing subject that matters in deciding "core" literature in that subject.

The list of relevant journal titles (167) was further checked with JCR 1987 to findout their I F. It is observed that 41% of the titles did not find a place in JCR at all. This is probably due to the fact that many of these titles appear to be of popular news magazine type. The journals cited in OTC and finding a place in SCI are listed (Appendix 1). Only 11 of those could be categorised as core 'Ocean Technology' journals on the basis of covering exclusively those topics which are dealt in the OTC Proceedings. The Proceedings of the OTC would find a fourth place among these journals if ranked according to the I F. The journals, i.e. Marine Mining, Journal of Waterways, Port Harbour Division ASCE, and the IEEE Journal of Oceanic Engineering are having I F higher than the OTC Proceedings. On the basis of these observations, it is felt that the OTC Proceedings have made a *good* reputation as far as I F is concerned.

Internationality

Internationality of the publication could be checked at two levels:

a) The editorial board, and
b) The authors contributing to the publication

The editorial board as such does not exist for OTC proceedings. The responsibilities of the editorial board, like selection of papers on the basis of relevance, timeliness and quality, etc. rest on the Program Committee. This committee for the years 1989 and 1990 was found to be purely US based. Therefore the scoring of the Proceedings in this respect is *not satisfying.*

Efforts to find out internationality among the authors on count basis could not work because of the lack of authors' complete addresses in the papers or anywhere else in the proceedings. However, in the introductory pages of the proceedings of the year 1990, it is mentioned that authors from 19 nations are participating in the program. The score may be fixed at just *satisfactory* in this case.

Timeliness/Regularity

The OTC is an yearly programme taking place on schedule. The correspondance with authors from OTC office reflects on their strictness in adhering to the deadlines for submission of abstracts, papers, and other materials to be used for presentation at the conference. The proceedings are invariably available to the participants during the conference and subsequently to other institutions for purchase. It is observed that some of them have even gone out-of-print when the orders were delayed a little bit. This shows that the proceedings scores *very good* in this criteria of the assessment.

Use of International Editorial Convention

The format of papers in the proceedings is very close to that of the international editorial conventions. It includes the title, the names of the author(s), their affiliations, an abstract, an introduction, statement of theory and definitions, description and application of the equipment and the processes, presentation of the data and the results, interpretation of the data, conclusions, nomenclature, acknowledgements and the references. The restrictions on the length of the paper and style of presentation are spelt out in detail in the author's kit. However, the contents of the paper are not reviewed and are subject to correction by the authors. The score in this respect is also *good.*

Language

The language of the conference and the papers presented in the proceedings is only English. This is the most common language used by the scientists for international communication. Once again the Proceedings scores a *very good.*

Refereeing System

The solicitation of the technical papers presented at the conference is made primarily on the copy of an abstract alone submitted earlier. The abstracts are invited on a specific form wherein the author has to summarize the scope and the nature of the work, describe the possible application of knowledge provided in the paper, describe the results and conclusions of the work and state the most significant aspect of the subject matter. The form contains four parts: Description; Application; Results; Observations and Conclusions and Significance of the subject matter. The author has to spellout the information on his work which he wishes to contribute to the conference under these headings in as detailed as 300 words. Actually, information of this size appears more appropriate to be titled as 'synopsis' instead of 'abstract'. It is seen in many journal's the 'instructions to authors', state that the length of an abstract is restricted to around 150 words. In the light of this the score may not be above *satisfactory* level in this case.

The preliminary information or synopsis of the work supplied on the abstract page is sufficient to judge the quality and relevance of the work. The Program Comittee members review and select on the merits of the work. This methodology for selection of a specific paper appears to be very convenient from the timeliness point-of-view and enough to judge the quality of the work.

The OTC while conveying the acceptance of the paper, intimates the author that they reserve the right to reconsider their acceptance of the full length paper if it subsantially differs from the descriptions given in the abstract/synopsis. Further, all manuscripts are reviewed for conformance of the size and other editorial standards before incorporating in the proceedings.

Table 1

Impact Factor of OTC Proceedings for 1989 and 1990

(Previous Two Years)

Year (a)	No. of citations to (b)	Source items in (c)	I F (d=b/c)
1989	85	262+265	0.1613
1990	98	265+307	0.1717

Table 2

Rating of OTC Proceedings

Marks: 10 = Very good, 7 = Good, 4 = Satisfactory, 1 = Fair

Sl. No.	Parameter	Marks	Max. Marks
1	Impact Factor	7	10
2	Internationality in editorial board	1	1
3	Internationality in authors	4	10
4	Timeliness	10	10
5	International Editorial Convensions	7	10
6	Language	10	10
7	Refereeing System	4	10
	Total	43 (61.42%)	70

Reputation of the Publisher

The OTC is jointly sponsored by well established, highly reputed and respected marine science wings of the professional societies. The reputation of the society could be decided on the basis of their membership, programmes and publications. It is understood from the proceedings of OTC (1990) that the sponsoring societies have a total membership of over 700,000. They publish various journals, conference proceedings, etc. in respective disciplines.

Though all societies are US based, their standing - the worldover in the respective disciplines is beyond any doubt.

CONCLUSION

Using the above observations and rating each parameter of the assessment as

Very good (100% satisfying conditions),

Good (almost satisfying conditions),

Satisfactory (average/ordinary standard) and

Fair (not satisfying but showing the mere existence).

By fixing the scores at 10, 7, 4 and 1 respectively to these ratings out of 10, the evaluation of OTC proceedings would be viewed as shown in the Table 2.

On the basis of this rating, it is suggested that the papers published in the OTC Proceedings may be considered at par with the journal articles and be placed appropriately in the rank list of the relevant journals and be considered as quality publication.

It might be difficult for the OTC to improve on its refereeing system due to timebound tasks but there should not be any difficulty in considering international representation in the Program Committee, printing complete addresses of authors on respective papers and adhering to the editorial style of papers. This would certainly add to the merits of OTC and benefit the authors when their works are evaluated.

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APPENDIX 1

Journals cited in the OTC Proceedings of 1990

(Listed in decreasing order of I F (JCR 1987). The journals marked with '*' could be considered as core journals in 'Ocean Technology'

I F	Title
14.999	Nature
14.304	Science
6.839	Journal of Geophysical Research
3.213	Geochemica et Cosmochemica Acta
3.212	Earth and Planetary Science Letters
2.525	Quarterly journal of the Royal Meteorological Society
2.313	Bulletin of the Seismological Society of America
2.078	Journal of Physical Oceanography
2.077	Deep-Sea Research
*1.647	Marine Mining
1.614	Journal of Fluid Mechanics
1.597	Proceedings of the Royal Society of London. A
1.574	Journal of Colloid Interface Science
1.571	AAPG Bulletin
1.402	IEEE Transactions on Software Engineering
1.346	IEEE Software
1.312	Journal of the Acoustical Society of America
1.236	Philosophical Transactions of the Royal Society, London. A
1.233	IEEE Transactions on Automat. Contr.
1.181	Water Research
1.112	Marine Geology
1.084	Geophysics
1.041	IEEE Transactions on Systems, Man and Cybernetics
1.041	Chemical Geology
1.000	Canadian Journal of Earth Sciences
0.985	International Journal of Control
0.980	International Journal for Numerical Methods in Engineering
0.976	Review of Scientific Instruments
0.949	Geotechnique
0.939	Geological Journal
0.928	Chemical Engineering Science
0.887	Automatica
0.859	Journal of Chemical Engineering in Japan
0.836	Journal of Research of the National Bureau of Standards
0.809	Ambio
0.767	Journal of Glaciology
0.722	Journal of Geochemical Exploration
0.722	Journal of Engineering Mechanics Division ASCE
0.683	Journal of Hydrology
0.669	International Journal of Multiphase Flow

Contd

0.632	International Journal for Numercial and Analytical methods in Geomechanics
0.619	Corrosion
0.613	Powder Technology
0.604	Journal of Sound and Vibration
0.604	Journal of Aerosol Science
0.601	Journal of Geotechnical Engineering Division ASCE
0.597	Journal of Hydraulics Engineering
0.570	IEEE Computer Graphics and Applications
0.554	Engineering Fracture Mechanics
0.549	Journal of Applied Mechanics
0.521	International Journal of Solids and Structures
0.515	Journal of Structural Division ASCE
0.466	Optimal Control Applications and Methods
0.458	Geo-marine Letters
0.443	International Journal of Mechanical Sciences
*0.423	Journal of Waterway, Port Harbour Division ASCE
*0.420	IEEE Journal of Oceanic Engineering
0.419	New Zealand Journal of Agricultural Science
0.413	Chemical Engineering Research Design
0.404	Journal of Hydraulics Research
0.381	Revue de l' Institute Francais du Petrole
0.381	Chemical Engineering News
0.368	Journal of Strain Analysis
0.358	Scandinavian Journal of Metallurgy
0.351	Computers and Structures
0.347	New Zealand Journal of Geology and Geophysics
0.341	Canadian Geotechnical Journal
0.330	Engineering and Mining Journal
0.307	Journal of Oil Color Chemists Association
0.250	Thin Walled Structures
0.245	Journal of Dynamic Systems Measurement and Control
0.243	Journal of Petroleum Technology (JPT)
0.206	Engineering Structure
0.200	Journal of Constructional Steel Research
0.197	New Zealand Journal of Marine and Freshwater Research
0.193	Journal of Fluid Engineering
0.173	Journal of Testing and Evaluation
0.165	Welding Journal
*0.157	Applied Ocean Research
*0.156	Ocean Engineering
0.153	Zeitschrift F angw. Math und Mech.
0.147	Society for Petroleum Engineers Journal
0.147	Material Performance
*0.141	Marine Technology Society Journal
*0.136	Oil & Gas Journal
*0.133	Marine Geotechnology
*0.130	Journal of Ship Research
0.101	Journal of Transportation Engineering ASCE
0.080	Journal of Pressure Vessel Technology

Contd

0.073	Journal of Wind Engineering and Industrial Aerodynamics
0.071	Journal of Energy Resources and Technology
0.064	Journal of Engineering for Industry
*0.039	Naval Engineers Journal
0.026	World Oil
*0.020	Marine Technology
0.015	Acta Polytechnica Scandinavia
0.000	Transactions of American Society of Mechanical Engineers
0.000	EOS Transactions of American Geophysical Union

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USE OF AN EXISTING THESAURUS IN A KNOWLEDGE BASED INDEXING AND RETRIEVAL SYSTEM

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A simple heuristic method is proposed to use an existing thesauri for weighted indexing.

INTRODUCTION

Since 1976 [1] people have tried to use the idea of fuzzy set theory in information retrieval. Although a lot of theoretical papers and reviews had appeared on this subject [1], [2], [3], [4], [5], [6], very little use of the idea was made in actual implementations. So it seemed that fuzzy set theory was a dead issue in information retrieval. However, good ideas never die, they just come back in a different form. In the case of fuzzy set theory, the idea was incorporated in knowledge-assisted document retrieval processes [7], [8]. So, fuzzy sets became a part of the artificial intelligence stream which now - a -days pervades every scientific and technological enterprise [9], [10]. Although everybody is not convinced of the utility of knowledge structures in information retrieval [11], it may be confidently stated that in the near future, a lot of effort will be put into the application of artificial intelligence systems for indexing and retrieval purposes. In this paper, a heuristic approach is proposed based on the fuzzy set theory to use an existing thesaurus for weighted indexing. Retrieval, then, can be done by using whatever proper method.

The use of thesauri in weighted retrieval has already been studied by Reisinger [12], Redecki [13], Mazur [14] among others.Miyamoto et al. [15] have experimented it with a computer-generated thesaurus.
These investigations, however, seem needlessly complicated, partly because of the interweaviing of indexing and retrieval phase and partly because of too restricting mathematical requirements. More realistic is the approach taken by sommar and Dennis [16]. They designed a weighted term information retrieval system, which has been in effective use by Celanese Fibres Co. Here indexing is done by using a thesaurus (without using weights) but weighted terms specified in the search strategy are expanded to include their narrower terms. These are selected from the thesaurus by computer. Their system is a good example of an unsophisticated, but practical use of a thesaurus.

In this paper, an elaborate and simple approach is proposed employing the use of an existing (unweighted) thesaurus and considering only the indexing phase. This has, among other things, the advantage that no new thesaurus need be constructed.

DESCRIPTION OF A THESAURUS

A thesaurus consists of two sets : a set of signs which stand for concepts, called the descriptors of the thesaurus and a set of relations between these signs. There exists moreover a bijective corresponsence between the descriptors and the concepts and also a bijective correspondence of the relations between descriptors and the relations between concepts. So a thesaurus may be described as a relational system [1]. In this section most of the examples of thesaurus structure are taken from the Medical Subject Headings (MeSH). 1985, the thesaurus used in Index Medicus.
Following procedure may be adopted to obtain a bijective correspondence between the descriptors and the concepts :

Homographs should be removed by

marking the descriptors accordingly, e.g. helix (snails) and helix (part of the ear).

Synonymy may also be defined properly. Synonyms are terms with meanings so closely related that the terms are regarded as interchangeable.

Quasi-synonyms are terms of which the meanings are generally regarded as different for ordinary usage, but are treated as synonyms for indexing purposes.

Most of the thesauri solve the problem of synonymy by distinguishing a preferred synonym. This is indicated by USE,--> or SEE. All other relevant synonymous or quasi-synonymous descriptors are indicated by UF = or X.

Example : Broca area SEE frontal lobe: frontal lobe X Broca area.

To achieve a one-to-one correspondence of the relations between descriptors and the relations between concepts, hierarchical relations, are defined. The hierarchical relationship has a converse, and the terms that share it are known as broader terms and narrower terms. BT (or <) is the symbol for a broader term and NT (or >) for a narrower term. There are two kinds of hierarchical relations : the generic relation, which is the link between a class and its members and the hierarchical whole-part relationship (partitive relation) which implies the link between the name of the part and the whole.

Examples :

The term "face" is broader than "chin", but narrower than "head" (partitive relation);

The term "beetles" is broader than "tenebrio", but narrower than "insects" (generic relation).

It may also be noted that BT and NT are defined only on the set of preferred terms.

According to Reisinger [12] the narrower terms of the same broader term are called related terms, denoted by RT, -- or "see related", but in most of the existing thesauri the relation RT is often used for all kinds of terms that are conceptually associated with each other.

Example : "breast" see related : "mastectomy".

Synonymy is an equivalence relation. It may be reflexive, symmetric or transitive. The preferred term can be considered as the representative for the class of all synonymous terms. The hierarchical relation on the other hand is irreflexive and asymmetrical. BT or NT does not only denote the immediate broader term or narrower term respectively but is also transitive and therefore it is a strict partial order. The generated relation RT is symmetric and transitive as per the Reisinger's definition, otherwise RT is only symmetrical.

As BT is a strict partial order in a finite set, it can be considered as a finite graph, denoted by T. On this graph we can define a distance function $d_{\mathcal{T}} : T \times T \to N_{\infty}$ (the set of nonnegative integers and infinity) by setting $d_{\mathcal{T}}(x,y)$ equal to the number of edges in a shortest path between x and y; $(x,y) \in T \times T$. If x and y can not be joined then $d_{\mathcal{T}}(x,y) = \infty$

A GENERALIZED SYNONYMY FUNCTION ON A THESAURUS

A function $w : T \times T \to [0,1]$ is defined to indicate how closely the terms of the thesaurus are related. If x and y are different preferred terms, then

$$w(x,y) = 1 - \frac{2}{\pi} \operatorname{arctg}(d_{\mathcal{T}}(x,y)); \quad x \# y.$$

This gives the following table of values :

$d_{\mathcal{T}}(x,y)$	w (x,y)
1	0.5
2	0.295
3	0.205
4	0.156
5	0.126
6	0.105
7	0.090
8	0.079
9	0.070
10	0.063
∞	0

For each preferred term x_j a graph G_j is formed which indicates its closeness with its equivalent terms : the descriptors which are interchangeable in every context. In actual thesauri all quasi-synonymous terms are at a distance "one" from the preferred term, but it is suggested to expand this relation so as to obtain a finer structure. If xj and yj are synonymous terms, the following equation may represent the relationship between them :

$$W\ (x_j,\ y_j) = 1 - \frac{0.8}{\pi} \text{arctg} \left[\frac{d_{G_j}(x_j,\ y_j)}{3}\right]$$

The numbers o.8 and 3 are chosen to yield reasonable results in an actual artificial intelligence environment, these numbers can be subjected to a learning (feedback) procedure. The above proposal yields :

$D_{G_j}(X_j,Y_j)$	$w\ (X_j,Y_j)$
0	1
1	0.918
2	0.850
3	0.800
4	0.764
5	0.737
6	0.718
7	0.703
8	0.691

It may be noted that $w\ (X_j,\ Y_j)$ is always> 0.6.

Finally, if x and /or y are non-synonymous non-preferred terms, then $w\ (x,y) = w\ (x_1,\ y_1)$, where x_1 is the preferred term for x and y_1 is the preferred term for y.

It is obvious that the function w as defined above is reflexive when $w\ (x,x) = 0$ and symmetric when $w\ (x,y) = w\ (y,x)$, but it does not satisfy the triangular inequality.

USE OF THE GENERALIZED SYNONYMY RELATION FOR WEIGHTED INDEXING

Weighted indexing can be a heavy task indeed. If D is the set of documents, then weighted indexing consists in associating with every $d \in D$ (every document of the collection) a function μ_d from T to the interval [0, 1] :

$$\mu_d : T \rightarrow [0,1] : t \rightarrow \mu_d\ (t)$$

The number $\mu_d\ (t)$ is called the index weight of the term t in d. Whether this index weight is based on relevance, weighting [17], or a fuzzy membership value [1] or is obtained in still another way, is immaterial for indexing purposes, although it may be noted that it coincides probably most easily with the fuzzy set approach. Therefore, using the generalized synonymy function, indexing can be done in a very thorough and yet simple way. It is required to know only the list of descriptors. Having assigned a few terms and index weights with regard to a particular document :

$$\mu_d\ (tk) : k = 1, ..., n \text{ for every } t \in T :$$
$$\mu_d(t) = \max_{k=1,\dots n} (w\ (t,t_k).\mu_d(t_k))$$

The actual calculation of every $\mu_d(t)$ is, course, done with the help of computer.

CONCLUSION

The method of indexing described in this paper has the following advantages :

1) Indexing is complete because a strict positive weight is assigned for every descriptor in every document.

2) The indexer need not bother about preferred terms. On the contrary he might in some cases consider a quasi-synonym to be the best.

3) Related terms get index weight which do not differ much.

4) The weights given by the indexer remain usually unchanged. Changes can only occur if the indexer has used a large number of related terms (for instance quasi-synonyms) with different weights. In this sense one can say that the system has some "intelligence", for it corrects logical errors.

It has some disadvantages also, the most obvious one being the requirement of enormous amount of space necessary to store every index weight. If necessary, this, however, can easily be reduced by using a threshold value : index weights which fall below the threshold value may be considered zero. This threshold should be chosen small enough so that indexing remains reasonably complete.

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CITATION STUDY OF THE MARATHWADA UNIVERSITY JOURNAL - A CASE STUDY OF THE USE PATTERNS BY SCHOLARS

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Citation analysis of 1906 citations collected from the Marathwada University Journal covering the period 1975-84 was made to determine the use pattern of the literature by the scholars in the field of zoology. Gives the analysis of the principal bibliographic forms, the journals used and their distribution according to the countries of origin and language. Studies the self-citation pattern, obsolescene, productivity and chronological distribution of journals and the application of Bradford's Law to the zoological literature.

INTRODUCTION

Citation analysis is so far the most popular technique used in bibliometrics. The citations help the librarian to know the study habits of the scholars whereby he could offer better services and make a more meaningful acquisition programme for the library.

Literature use patterns by the scholars in the Marathwada University is studied by the citation analysis of Marathwada University Journal of Natural Sciences. The journal is outstanding in the field of its coverage, and is intended mainly for publication of research work done by the teachers and students of Marathwada University and other eminent scholars working in the University campus. It publishes original papers and notes in the field of biological sciences (botany, zoology and biochemistry), physical sciences (physics and chemistry) and mathematics.

AIMS AND OBJECTIVES

The study was undertaken with a view to examine the use pattern of literature by the scholars in the University Department of Zoology. It intends to:

1) Identify the principal bibliographic forms, their languages and countries of origin.
2) Compile a rank list of cited journals and monographs.
3) Study the frequency of cited journals, chronological distribution of citations and cases of self-citations.
4) Determine the obsolescence of journal literature, and study the productivity of journals by application of Bradford's Law.
5) Study the use of journals acquired by the library.

METHODOLOGY AND SCOPE

The study is based on the citations given at the end of each article published in ten volumes of the Marathwada University Journal (1975 to 1984). The bibliographic details of the source articles and cited documents were recorded on catalogue cards. The data was tabulated and analysed.

The study was restricted to the literature published on Zoology in 10 selected volumes of the journal. The word scholar in the title of the study includes a university teacher, a teacher from the affiliated college, an eminent personality working within the university campus or a Ph.D. student.

ANALYSIS

During the period 1975-84, 190 articles were published on zoology in the Marathwada University journal. These articles contained 1906 citations with an average of 10.19 references to each article in the journal (Table 1). The average number of citations per article does not differ much from de Solla Price's norm of 10-20 references per article.

Forms of Documents

In all, there were 1906 citations. These citations consist of different bibliographic forms as shown

Table 1

Yearwise Distribution of Citations (Source data).

Year	Citing Articles		Cited Documents		Percentage
	Number	Cumulation	Number	Cumulation	
1975	37	37	275	275	07.43
1976	31	68	339	614	10.93
1977	44	112	461	1075	10.47
1978	10	122	122	1197	12.20
1979	11	133	085	1282	07.72
1980	08	141	104	1386	13.00
1981	07	148	046	1432	06.57
1982	13	161	110	1542	08.46
1983	14	175	197	1739	14.07
1984	15	190	167	1906	11.13
1975-84	190		1906		10.19

Table 2

Bibliographic Forms of Citations

Type	Number of Citations	Percentage	Cumulative Citations	Percentage
1.	2.	3.	4.	5.
Books	305	16.00	305	16.00
Journals	1349	70.78	1654	86.78
Conference Proceedings/ Symposium	164	08.60	1818	95.38
Theses	058	03.05	1876	98.43
Reports	030	01.57	1906	100.00
Total	1906	100.00		

Table 3

Analysis of Theses from Various Universities

Sl.	Name of University	Number of Theses
1.	Marathwada	43
2.	Bombay	03
3.	Srivenkateshwara, Tirupati	03
4.	Madras	02
5.	Nagpur	02
6.	Andhra	01
7.	Garheval University	01
8.	University of Toronto, Ontario	01
9.	University of Hawai, Honolulu	01
10.	Stanford University, California	01
	Total:	58

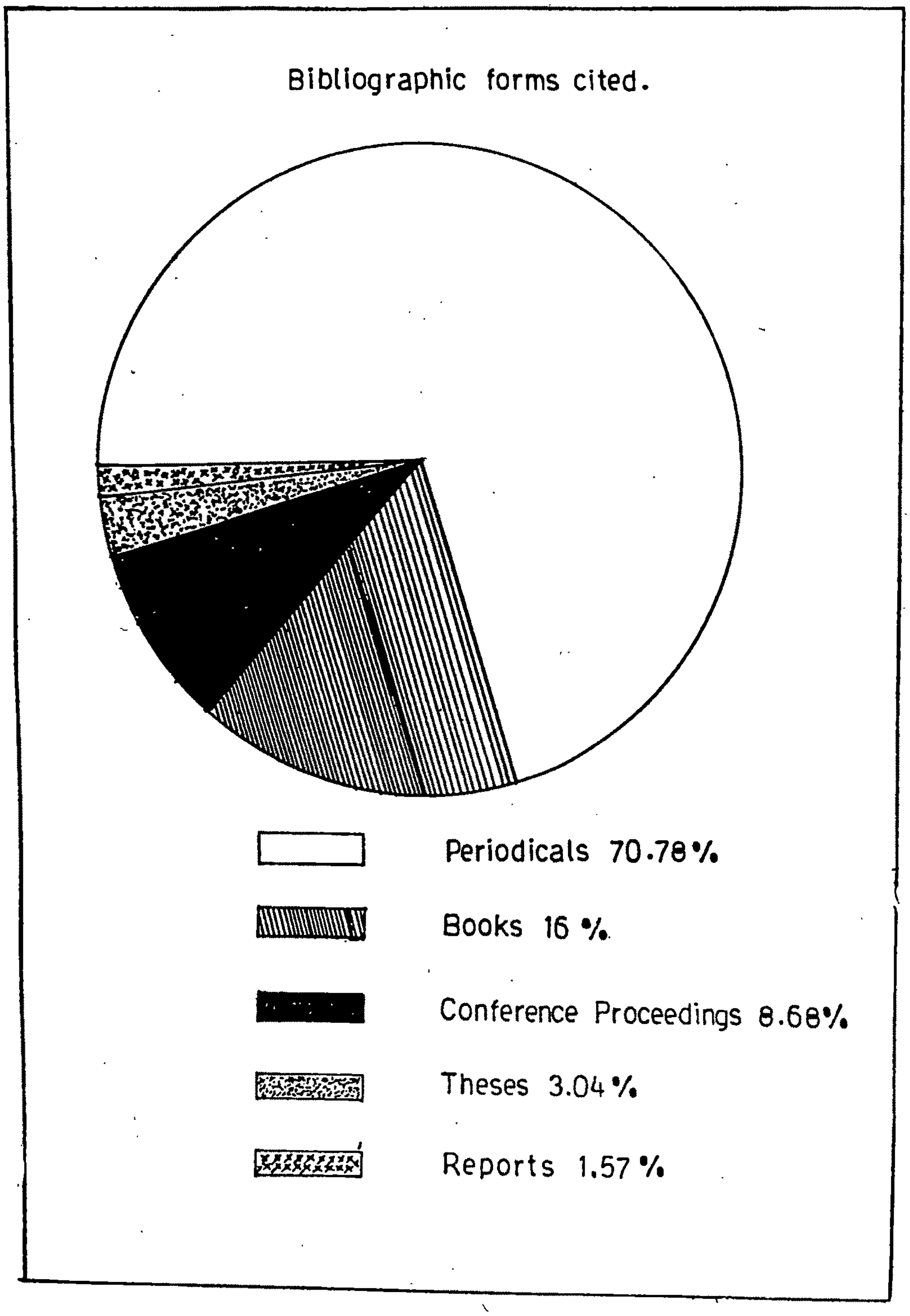
Bibliographic forms cited.
Periodicals 70.78%
Books 16 %
Conference Proceedings 8.68%
Theses 3.04%
Reports 1.57%

Fig. 1

Table 4
Countrywise Distribution of Cited Journals

Sl. No.	Country	Number of Journals	Percentage	Number of citations	Percentage
1.	India	70	18.81	375	27.80
2.	U.S.A.	76	20.43	334	24.76
3.	Germany	31	08.33	92	06.82
4.	U.K.	29	07.79	178	13.19
5.	Japan	25	06.72	53	03.93
6.	France	21	05.64	57	04.22
7.	Netherlands	15	04.03	55	04.08
8.	Canada	11	02.95	43	03.19
9.	Hungary	05	01.34	10	0.74
10.	Australia	05	01.34	08	0.59
11.	U.S.S.R	05	01.34	05	0.37
12.	Poland	05	01.34	09	0.66
13.	Italy	04	01.07	20	01.48
14.	Belgium	04	01.07	04	0.30
15.	Czhekoslavakia	03	0.80	03	0.22
16.	Pakistan	03	0.80	05	0.37
17.	Newzealand	03	0.80	06	0.44
18.	Switzerland	02	0.53	06	0.44
19.	Brazil	01	0.26	01	0.07
20.	Denmark	03	0.80	07	0.51
21.	Scotland	01	0.26	02	0.15
22.	Taiwan	01	0.26	03	0.22
23.	Turkey	01	0.26	01	0.07
24.	Romania	02	0.53	03	0.22
25.	China	02	0.53	02	0.15
26.	Sweden	01	0.26	03	0.22
	Unidentified	43	11.55	44	0.26
	Total	372	100.00	1,349	100.00

Table 5
Languagewise Distribution of Cited Journals

Sl. No.	Language	Number of citations	Percentage of citations	Cumulative citations	Cumulative % of citations
1.	English	1323	98.05	1323	98.07
2.	German	16	1.20	1339	99.25
3.	French	10	0.75	1349	100.00
	Total:	1349	100.00		

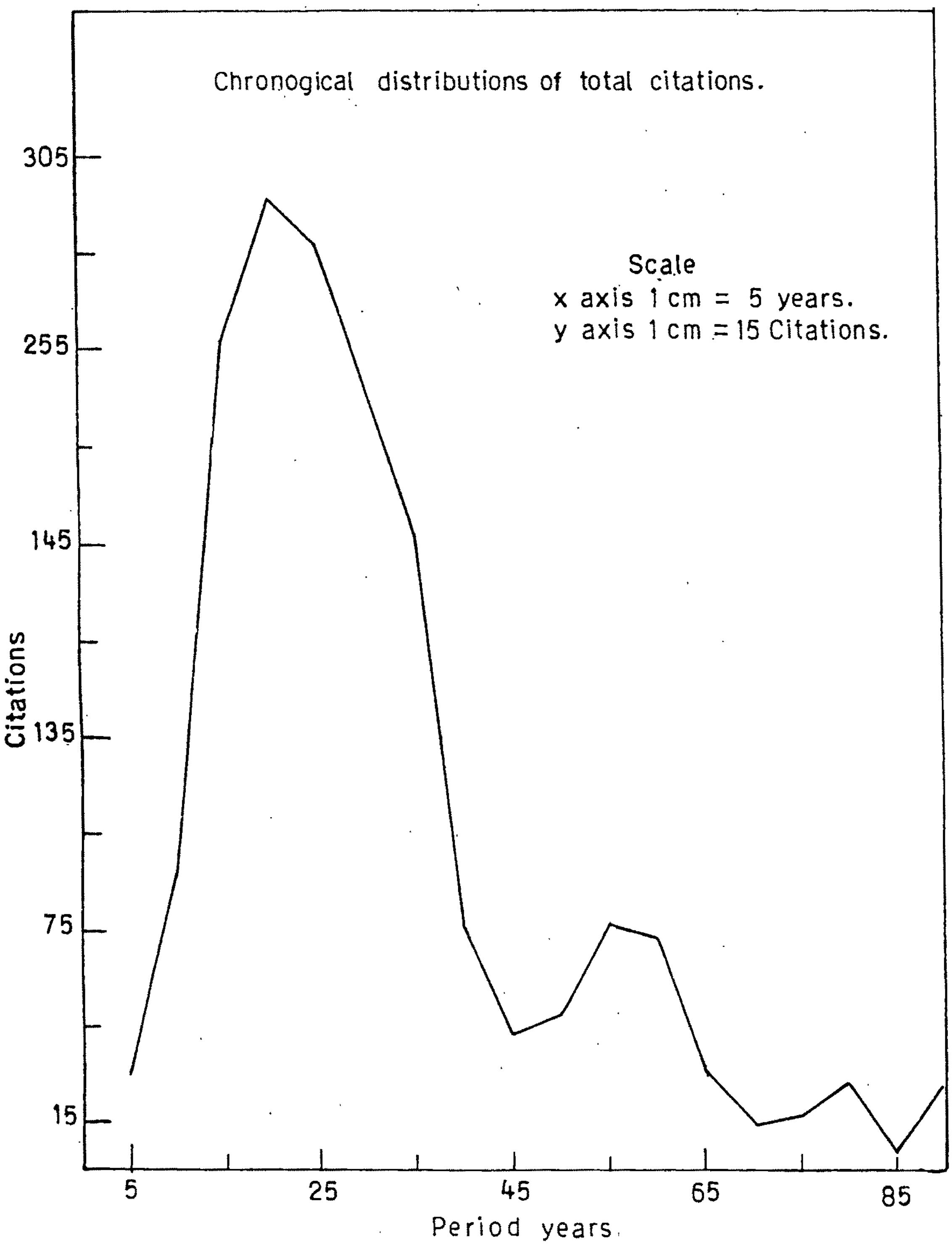
Chronogical distributions of total citations.
Scale
x axis 1 cm = 5 years.
y axis 1 cm = 15 Citations.
Citations
305
255
145
135
75
15
5
25
45
65
85
Period years

Fig. 2

Table 6
Rank List of Journals

Sl. No.	Rank No.	Nameof the Journal	Country	No. of Citations	Citation perce-ntage	Cumul-ative Citations	Cumul-ative percentage	Remarks
1.	1	Marathwada University J	India	52	3.85	52	03.85	
2.	2	Biol Bulletin	USA	44	3.26	96	07.11	Subscribed by the library
3.	3	Comp Biochem Physiol	USA	42	3.11	138	10.22	
4.	4	Indian J Fish	India	40	2.96	178	13.18	
5.	5	Current Science	India	27	2.00	205	15.18	-do-
6.	6	J Bombay Nat Hist Soc	India	24	1.78	229	16.96	-do-
7.	6	J Marine Biol Assoc	U K	24	1.78	253	18.74	
8.	7	Hydrobiologia	Netherlands	23	1.70	276	20.44	
9.	8	Quar J Microscop Science	U K	22	1.63	298	22.07	
10.	9	Gen and Comp Endocrinology	USA	21	1.56	319	23.63	-do-
11.	10	Indian J Entomology	India	20	1.48	339	25.11	
12.	11	Ind. J Helminthology	India	19	1.40	358	26.51	
13.	11	Science and Culture	India	19	1.40	377	27.91	-do-
14.	12	J Expt Biol	U K	18	1.35	395	29.26	-do-
15.	13	Biochem J	U K	17	1.26	412	30.52	-do-
16.	13	Indian J Expt Biol	India	17	1.26	429	31.78	-do-
17.	13	Physiol Zool	USA	17	1.26	446	33.04	-do-
18.	14	Can J Zool	Canada	16	1.13	462	34.22	-do-
19.	15	Annls Entomological Soc	USA	14	1.03	476	35.25	-do-
20.	16	Parasitology	U K	13	0.96	489	36.21	-do-
21.	16	Z Angew Zool	Germany	13	0.96	502	37.17	
22.	16	J Fish Biol	UK	13	0.96	515	38.13	
23.	17	CR Acad Science	France	12	0.89	527	39.02	
24.	17	J Parasitlogy	USA	12	0.89	539	39.91	

Contd.

Sl. No.	Rank No.	Nameof the Journal	Country	No. of Citations	Citation perce-ntage	Cumul-ative Citations	Cumul-ative percentage	Remarks
25.	17	Records of Indian Musemum	India	12	0.89	551	40.80	Subscribed by the library
26.	17	Rivista de Parasitologia	Italy	12	0.89	563	41.69	-do-
27.	18	Japan J Zool	Japan	11	0.81	574	42.50	
28.	18	J Helminthology	UK	11	0.81	585	43.31	-do-
29.	18	J Vergl Physiol	Germany	11	0.81	596	44.12	
30.	19	J Zool Soc	India	10	0.74	606	44.86	
31.	19	Oriental Insects	India	10	0.74	616	45.60	
32.	19	Trans Amer Microscop.	USA	10	0.74	626	46.34	
340	titles having less than 10 Citations each			1280	67.16	1280	67.16	
Total	372			1906	100.00	1906	100.00	

Table 7

Rank List of Monographs

Sl. No.	Rank	Title	No. of Times cited	Authors
1.	1.	Systema Helminthum	53	Yamaguti, S.
2.	2.	Zoology of Tapeworms	39	Wardle R.A. and Mcleod, J.A.
3.	3.	Fauna of British India	16	Southwell, T.
4.	4.	Synopsis of diagenetic trematodes of vertebrates	10	Yamaguti S.
5.	5.	Practical Physiological Chemistry	07	Hawk, P.B. and others.
6.	6.	Comparative Animal Physiology	05	Prosser C.L. and Brown, F.A.
7.	6.	Stained Methods for Examination of water and waste water	05	American Public Health Association

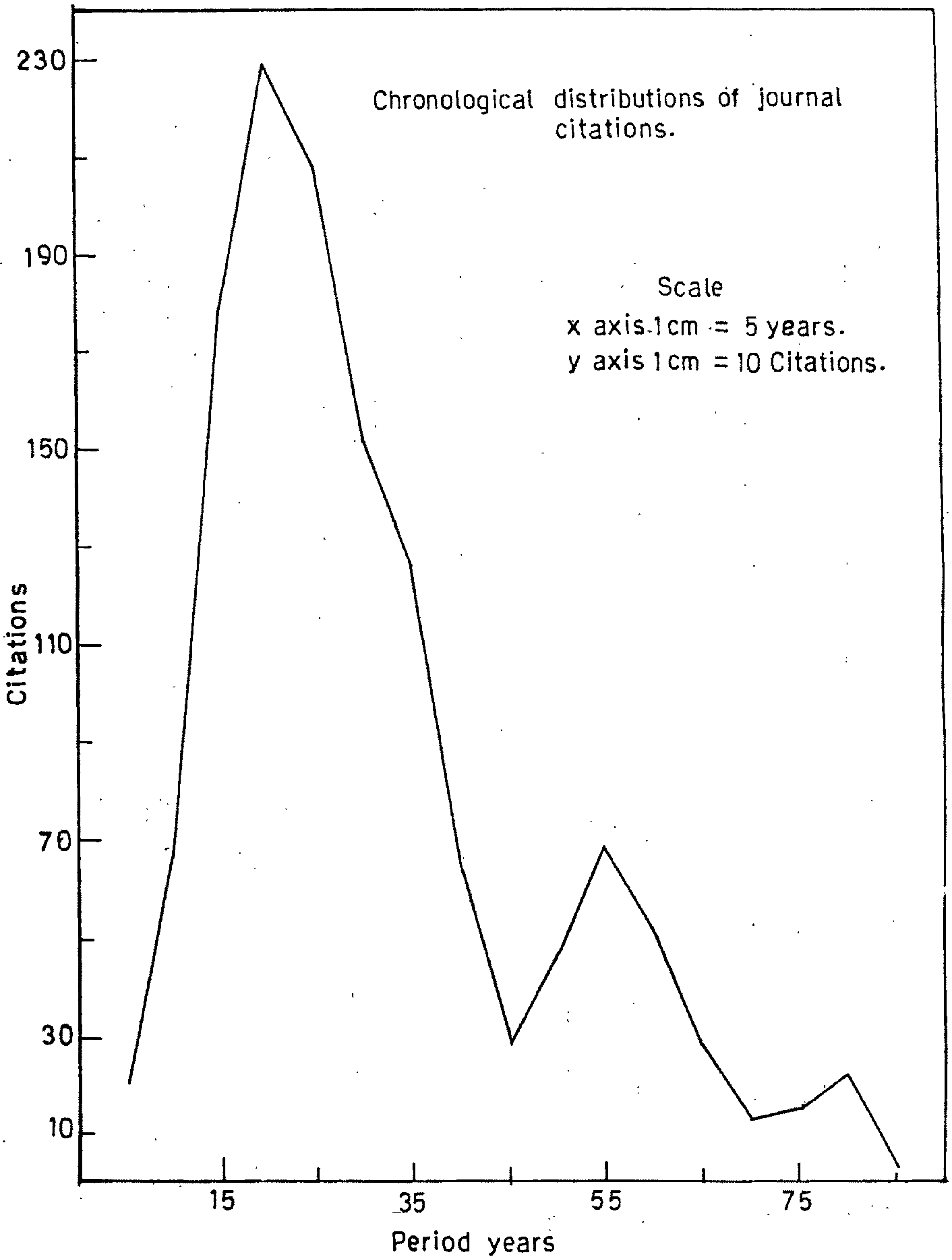
Chronological distributions of journal citations.
Scale
x axis 1 cm = 5 years.
y axis 1 cm = 10 Citations.
Citations
230
190
150
110
70
30
10
15
35
55
75
Period years

Fig. 3

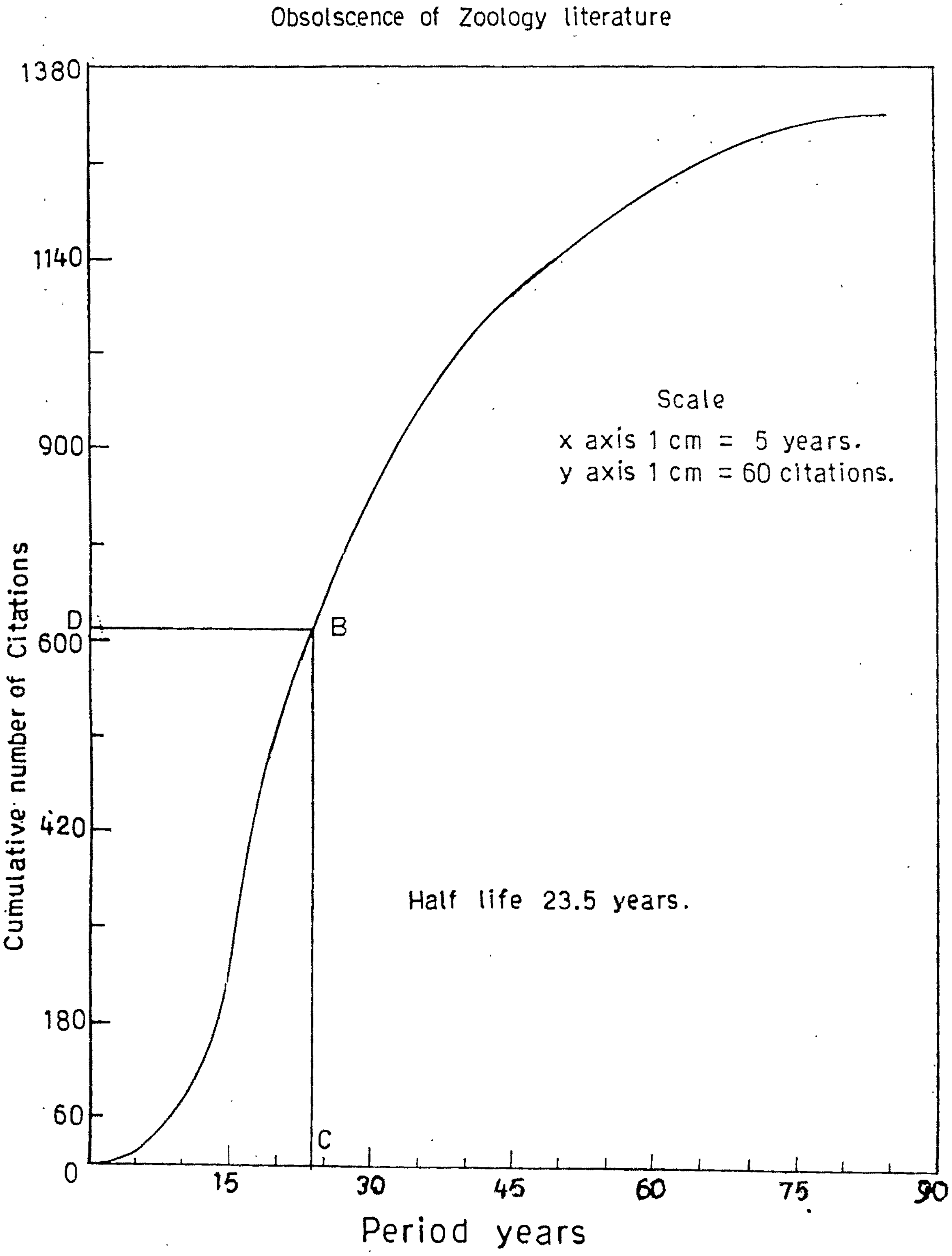
Obsolscence of Zoology literature
1380
1140
900
D
600
420
180
60
0
B
C
Cumulative number of Citations
15
30
45
60
75
90
Period years
Scale
x axis 1 cm = 5 years.
y axis 1 cm = 60 citations.
Half life 23.5 years.

Fig. 4

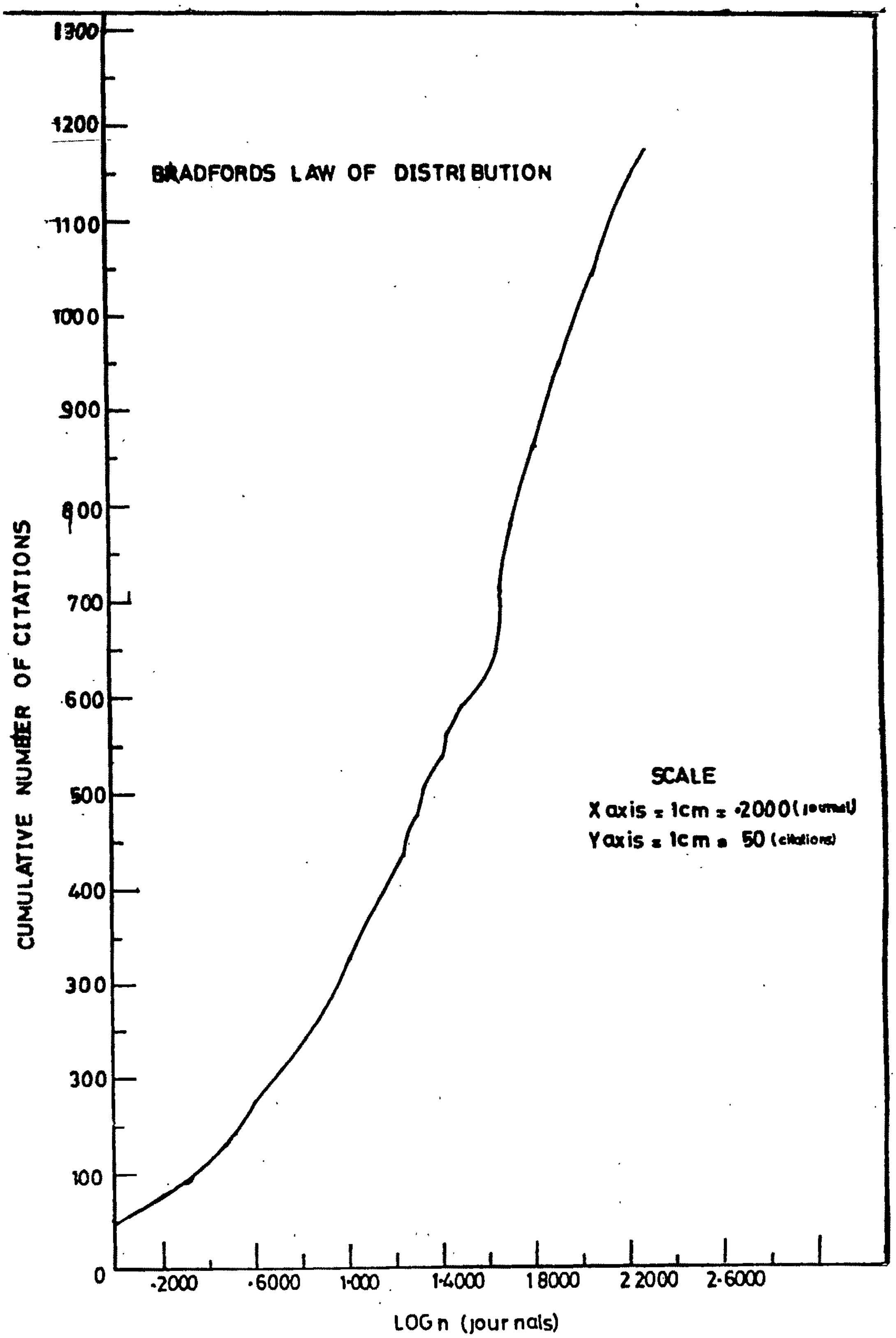
BRADFORDS LAW OF DISTRIBUTION
CUMULATIVE NUMBER OF CITATIONS
1300
1200
1100
1000
900
800
700
600
500
400
300
300
100
0
·2000
·6000
1·000
1·4000
18000
2 2000
2·6000
LOG n (journals)
SCALE
X axis = 1cm = ·2000 (journal)
Y axis = 1cm = 50 (citations)

Fig. 5

Table 8
Frequency Distribution of Cited Journals

Frequency	Journals used	percentage
1	2.	3.
1	198	53.22
2 - 5	115	30.91
6 - 10	31	08.33
11 - 15	10	02.68
16 - 20	08	02.15
21 - 25	05	01.34
26 - 30	01	0.26
31 - 35	-	
36 - 40	01	0.26
41 - 45	02	0.52
More than 45 times	01	0.26
Total	372	100.00

Table 9
Chronological Distribution of Citations

Period	Citations	Percentage
1985-81	30	01.49
1980-76	92	04.97
1975-71	260	13.20
1970-66	304	16.98
1965-61	293	15.41
1960-56	246	11.27
1955-51	200	09.34
1950-46	77	04.75
1945-41	42	02.15
1940-36	55	03.48
1935-31	79	05.11
1930-26	73	03.78
1925-21	34	02.07
1920-16	16	0.96
1915-11	23	01.11
1910-1906	27	01.63
1905-1901	08	0.22
1900 and earlier	27	01.33
Period not mentioned	20	0.74
Total	1,906	99.99

Table 10
Chronological Distribution of Journal Articles

Period	Citation	Cumulative Citations	Percentage of Citations	Percentage of Cumulative citations
1985-81	20	20	1.57	01.57
1980-76	67	87	4.82	06.39
1975-71	178	265	13.64	20.03
1970-66	229	494	15.95	35.98
1965-61	208	702	15.37	51.35
1960-56	152	854	12.90	64.25
1955-51	126	980	10.50	74.75
1950-46	64	1044	04.03	78.78
1945-41	29	1073	02.20	80.98
1940-36	47	1120	02.88	83.86
1935-31	69	1189	04.16	88.02
1930-26	51	1240	03.85	91.87
1925-21	28	1268	01.79	93.66
1920-16	13	1281	0.83	94.49
1915-11	15	1296	1.20	95.69
1910-1906	22	1318	1.41	97.10
1905-1901	03	1321	0.44	97.54
1900 and earlier	18	1339	1.41	98.95
Period not mentioned	10	1349	1.04	99.99
Total	1349			

Table 11
Pattern of Self-Citation

Number of times cited	No. of Authors	Percentage
1	13	56.52
2 - 4	05	21.74
4 - 8	01	04.35
8 and above	04	17.39
Total	23	100.00

Table 12

Distribution of Journal Citations into Quinquennium Periods

Period	Citations	Cumulative Citations	Percentage
1 - 5	20	20	01.57
6 - 10	67	87	06.39
11 - 15	178	265	13.64
16 - 20	229	494	15.70
21 - 25	208	702	15.37
26 - 30	152	854	12.60
31 - 35	126	980	10.30
36 - 40	64	1044	04.03
41 - 45	29	1073	02.20
46 - 50	47	1120	02.63
51 - 55	69	1189	04.16
56 - 60	51	1240	03.67
61 - 65	28	1268	01.79
66 - 70	13	1281	0.83
71 - 75	15	1296	1.20
76 - 80	27	1323	02.00
81 - 85	08	1331	0.59
86 - 90	18	1349	1.33
Total	1349		100.00

Table 14

Distribution of Citations into Zones

Zone	Number of	Percentage	Averagejournals productivity of journals
1	11	02.95	30.63
2	29	97.79	11.63
3	76	20.43	04.44
4	256	68.81	01.31
Total	372	100.00	

Table 13
Bradford's Law of Scattering and Zoological Literature

R	A	Rank	R X A	Cumulative Citations
1	52	1	52	52
1	44	2	44	96
1	42	3	42	138
1	40	4	40	178
1	27	5	27	205
2	24	6 (each)	48	253
1	23	7	23	276
1	21	8	21	319
1	20	9	20	339
2	19	10 (each)	38	377
1	18	11	18	305
3	17	12 (each)	51	446
1	16	13	16	462
1	14	14	14	476
3	13	15 (each)	39	515
4	12	16 (each)	48	563
3	11	17 (each)	33	596
3	10	18	30	626
2	09	19	18	644
9	08	20	72	716
9	07	21	63	779
8	06	22	48	827
6	05	23	30	857
23	04	24	92	949
33	03	25	99	1048
51	02	26	102	1150
199	01	27	199	1349

R = Number of Journals
A = Number of Citations

in Table 2 and Fig. 1.

The periodicals are observed to be the most cited form of literature accounting for 70.78% which confirms the universal belief "periodicals appear to be the most preferred source of information used by the scientists [2], [3]. The next major source of information for scientists is books accounting for 16% of the total citations. In other words, books and periodicals together meet nearly 87% of the total information needs. The remaining 13% requirements are met by the conference proceedings (8.6%), theses (3%) and reports (1.57%). Attempts were made to analyse the citations to theses according to the university as shown in the Table 3.

It can be observed from the above table that the Marathwada University theses are cited maximum (74.13%). This University is situated in the place where the journal of the present study is published. It shows that the scholars cite documents which are easily available to them.

Countrywise Distribution of Cited Journals:
It is very important to determine the geographical distribution of cited journals (and thereby that of the articles) while studying the use patterns of research literature. Table 4 shows the Citations to Indian and foreign journals.

Indian Coverage
The study revealed that the citations to 70 Indian Journals account for 27.80% (375) of total citations. Marathwada University Journal received the maximum number of citations.

Foreign Coverage
974 citations to 302 foreign journals accounting for 72.20% of the total citations were recorded.

It is clear from the table that only 19% of the journals used by the scholars were from India and remaining from abroad. From this it can be concluded that the scholars depend for their research and investigation mainly on the journals published from India, U.S.A., U.K. and Germany. The reason may be that the journals from these countries are published in English language. However, the usage of journals by Indian scholars, by and large, is global.

Languagewise Distribution of the Cited Journals

The analysis of 1,349 citations shows that 98.05% of the citations were in English, only 1.3% of the citations were found in German and French languages (Table 5).

From this it appears that the scholars in zoology depend mostly on research material published in English than those in other languages.

Rank List of Cited Journals

The journals cited for ten or more times are given in Table 6. With full details regarding their rank, country of origin and citation percentage. Marthwada University journal (India) scores the highest citation percentage (3.85). Similar to the findings of Kundu [5] and Mrs. Vaishnav [6], the source journal, i.e. Marathwada University journal was most frequently cited. The second and third ranks are scored by the journals from U.S.A. and so on.

Rank List of Monographs
It was observed from Table 7 that "Systema Helminthum" and "Zoology of Tapeworms" were the most popular publications among the scholars.

Frequency of the Cited Journals
The frequency distribution of cited journals was analysed as shown in Table 8. It is observed that 84% journals were cited 1-5 times, while 13% were cited 6-20 times and only 3% were cited for more than 25 times.

Chronological distribution of Total Citations and Journal Citations
It was felt necessary and relevant to know the age of the cited references. It is observed from the Tables 9 and 10 and Figs. 2 & 3 that nearly 63% of the citations were of the period 1956 to 1975 (20 years).

Self Citations

The objective was to know the pattern of self-citations. Fussler's study showed that in chemistry and physics a single important journal contained 25% of self-cited references. Table 11 shows that the percentage of self-citations in journal articles varies from 4 to 56.

OBSOLESCENCE OF ZOOLOGICAL LITERATURE

To find out the obsolescence of zoological literature all journal references appended to source documents were tabulated into 18 intervals of five years each. Last interval included the journals which have not shown the period of publication as shown in Table 12 (Fig. 4). The graph was plotted by taking years on the X axis and the cumulative number of citations of the journals on the Y - axis. To find out the half life, a line parallal to Y - axis was drawn from the point D to meet the curve at B.D represents half of the total citations. Then a perpendicular BC is drawn from the point B to meet the X - axis at C. OC represents the half-life of the literature, i.e. 23.5 years. This is much higher than the figures obtained by Line [9], Maheshwarappa and others [12] in the fields of science and technology (12.55 years), botany (12 years), veterinary medicine (12 years) and geo-science (12.5 years) respectively.

The data obtained in the study was tested for scattering. Accordingly the graph was plotted taking cumulative sum of journals R on the X - axis and the cumulative number of articles (R X A) on the Y - axis (Fig.5)

An initially rising and then turning into a linear curve was obtained which is in accordance with Bradford's hyperbolic curve (Fig. 5), signifying that the information use pattern of scholars in zoology is in conformity with the Bradford's Law of scattering.

Productivity of Cited Journals

In order to measure the productivity of cited journals, the total 1,349 citations were divided into four equal zones of 337 citations. The number of cited journals for each zone is given in Table 14.

It is observed from the table that the first zone of citations covers the first 11 journals of the ranked list, thus signifying their high rate of productivity. The average productivity of each journal in the first zone was 30.63 articles where as it considerably went down to 1.31 articles in the fourth zone confirming the decreasing productivity of journals in the ranked list.

CONCLUSION

The study is devoted to Marathwada University Journal (Zoology) and following findings are drawn from the analysis :

1) It is observed that the scholars conducting research in the field of zoology heavily depend on the periodical literature (71%).
2) Only 19% of the cited journals are from India.
3) Citations to English literature account for 98.7%.
4) 'Marthwada University Journal', the source journal scores the highest citation percentage.
5) Among the monographs "Systema Helminthum" and "Zoology of Tape worms" are most frequently cited.
6) 72.66% of total citations are from the period 1951-85.
7) The half life of the zoological literature is 23.5 years.
8) The literature of zoology under consideration confirms Bradford's Law of distribution.

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RATIONALIZING THE DEVELOPMENT OF SCIENTIFIC AND TECHNICAL INFORMATION SYSTEMS IN NIGERIA

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ABSTRACT

Nigeria has in principle made a commitment to the development of science and technology for the transformation of the national economy. However, the importance of information resources and systems in the success of scientific and technological enterprise does not seem to be adequately appreciated by the Government policy makers. Consequently the publishing industry and the library services have been adversely affected by the economic depression over the past decade. Nevertheless a continuous evolution of conceptual and mental orientation towards rational developments of scientific and technical information systems has been due largely to the efforts of some information specialists in creating necessary awareness and stimulating organizational support. In spite of initial setbacks, the use of information technology has become a matter of urgent interest in some university and research libraries, while two research libraries are serving as a model in automated services. Coordination of systems development for science and technology is necessary. This paper discusses the concepts of organizational structures and their coordinating functions.

INTRODUCTION

Most of the countries in the third world have realized that national wealth, standard of living, and political power in world politics depend on a country's capacity and capability of utilizing science and technology for her socio-economic development. Yet the support for the development of science and technology is often not matched by the budgetary allocation. Besides, policy makers appear to have difficulty in understanding the importance of information resources and systems for the success of the scientific and technological enterprise. Therefore, a status report is presented on the STI (Scientific and Technical Information) resources in Nigeria and the use of information technology.

STATUS OF STI SYSTEMS

Mental orientation to the development of STI systems in Nigeria is rather positive. In fact, discussions and recommendations on STI systems have not been lacking. Lawani and Odeinde examined in 1972 the prospects and policies for documentation and information services for science and technology in Nigeria [1, 2]. Odeinde [5] and others studied in detail the information needs of Nigerian scientists, examined the provision, accessibility and use of scientific literature [6, 7] and advocated for STI systems in Nigeria [8, 9].

Enough awareness and interest have, in fact, been generated to motivate various organizations to make some commitment, at least in principle, to the development of science and technology and information services support. This lead to the establishment of the National Science and Technology Development Agency (NSTDA) which was later transferred to the Ministry of Science and Technology, when it was created in 1979. The Ministry is responsible for making the national policy on science and technology and its implementation.

The Science Association of Nigeria, professional societies of various disciplines of science and technology and the Nigerian Library Association play a significant role in the development of STI systems.

Following are some of the valuable contributions made by various universities and research institutes towards the development of STI:

a) First Union List of Scientific and Technical Periodicals in Nigeria in 1970 by the library of the International Institute of Tropical Agriculture (IITA), Ibadan,

b) Union List of Serials in Nigerian Academic and Research Libraries by the library of the University of Ibadan,

c) Bibliographic control of scientific and technological research in the country by the Federal Institute of Industrial Research, Oshodi, Lagos, (FIIRO),

d) A survey of technical and industrial information needs in Nigeria, and

e) Organization of seminars and training sessions in computer applications in information processing,

f) The establishment of the Africa Regional Centre for Information Science at the University of Ibadan to develop expertise in the field,

g) National Bibliography of Nigeria published by the National Library of Nigeria,

(h) Organization of number of conferences, seminars and national workshops to stimulate concrete planning for a national bibliographic information system for science and technology, to promote resource sharing and to familiarise with the modern technology of data flow and application telecommunications in it.

LIBRARY AUTOMATION

While the computer market in Nigeria has been growing rapidly, the adoption of computers in the libraries is not significant inspite of the prevailing belief among the librarians about the usefulness of computers and automation in libraries [10]

It is only the University of Lagos Library which started using computers. Lack of trained personnel was one of the reasons for not adopting the computers in various institutions till 1988. Some of the universities made an attempt to use computers but could not get fruitful results because of the usual problems of untrained personnel, frequent breakdown of the computer, crashing of programmes, poor servicing, lack of spare parts and delays in attending the library jobs.

However, each of the four university libraries, i.e. the libraries of the universities of Ibadan and Ilorin, the Imo State University and the Federal University of Technology, Owerri, has acquired at least one micro-computer which they intend to use for serial control, data entry for a database, administrative file management, circulation control and word-processing.

In 1989, seven university libraries indicated that they would like to search OCLC, BNA, NOTIS, BLCMP, BLAISE, and Chemical Abstracts online if the necessary facilities were made available to them. Some libraries were already receiving output of literature searches from some of the databases including MEDLARS and PADIS by June 1989. No university library had yet completed the conversion of in-house records to machine-readable format. Only one library actually reported having made some progress.

Some of the research libraries, i.e. IITA Library and FIIRO Library have also made an attempt to automate some of the functions of the library. This may be attributed to the assistance given by the United Nations Industrial Development Organization (UNIDO).

DATABASE CREATION

For a developing country like Nigeria, it is a crucial problem to acquire/generate bibliographic databases for literature search in the STI systems.

Nigeria is now gradually getting the staff trained in computer applications which has made the problem of creating databases more feasible (Table 1) as a result of which the libraries serving STI users have started creating databases of their stocks. The Federal Ministry of Science and Technology is also making a useful contribution in both documentation and database development. It is currently undertaking a national survey of science and technology manpower in the country with the objective of creating a manpower database. The National Library of Nigeria is developing a database of the union catalogue of both monographs and serials of libraries in Nigeria. The FIIRO Library, one of the research libraries, is creating a database of current research projects in science and technology in Nigeria. This is in addition to the maintenance of

Table 1

Skills Available in University Libraries in 1989

Skills	No. of Libraries	No. of Specialists
Computer Science	3	4
Systems Analysis	7	9
System Design	5	7
Computer Programming	4	5
Data Entry	8	16
Online Searching	6	9
Word Processing	7	10

database in the areas of interest to its parent institute. FIIRO Library had created following 11 databases by the end of 1988:

AID (Answered Inquiries Database),
CAPSTAN (Colourants, Additives and Preservatives Standard),
CASE (Current Awareness Service on Economy),
COMPRESS (Company Profile for Extension and Similar Service),
DANTE (Data on Available Nigerian Technologies),
ITEM (International Technology Market),
MAIL (Mailing List),
PAIR (Patent Information Retrieval),
PIPE (Products and Industrial Profile Extracts),
RADIO (Research and Development Information Online and
STEP (Scientific, Technical and Economic Publications).

Another research library, the IITA Library is currently maintaining the most sophisticated inhouse bibliographic retrieval system in tropical agriculture. The system called ALISTRA (Automated Library and Information Service for Tropical Agriculture) contains records of materials available in the library, which are fully indexed for retrieval by various approaches. The database can be accessed through over 60 terminals and microcomputers scattered all over the institute. A serials control system, STACS, is also implemented. Besides the in-house database several databases on CD-ROM are acquired for literature search.

NATIONAL SCIENTIFIC AND TECHNICAL INFORMATION CENTRE

Discussions on STI system in Nigeria have lead to the establishment of the National STI Centre. The general expectation is that the centre should have a library maintaining a comprehensive collection of STI sources, documentation division, and a bibliographic and information retrieval system.

The centre is envisaged to perform following responsibilities:

a) Development and maintenance of a comprehensive collection of documents in the area of its relevance;
b) Production, maintenance and distribution of bibliographic databases;
c) Provision of current awareness services including abstracting and indexing services and selective dissemination of information;
d) Conducting literature searches on request;
e) Provision of referal services; and
f) Serving as the administrative and operational headquarters of a national STI network involving libraries providing STI services in Nigeria. The national STI centre may not necessarily exist as one physical complex. It may be structured on sectoral basis having several sectoral centres based on different disciplines.

NATIONAL NETWORK

The ultimate goal in rationalizing the STI systems in Nigeria is the implementation of an effective and efficient network system making STI databases accessible to users anywhere in the country also providing them the services of the international information systems. In the agricultural sector there are 17 large libraries belonging to the Federal Ministry of Science and Technology, Ahmadu Bello university, Obafemi Awolowo University, and the Universities of Ibadan and Nigeria. In the area of science and technology the Federal Ministry of

Science and Technology maintains at least 21 research institutes. Their libraries, together with at least 23 university libraries and 23 polytechnic libraries, will provide vast resources for the network. In the medical sector, there are seven important libraries to contribute to the network. These include the Central Medical Library, Yaba, Lagos and the library of the National Institute for Medical Research. Others are the medical libraries serving the teaching hospitals of Ahmadu Bello University and the Universities of Benin, Ibadan, Ilorin, and Nigeria. When the national STI network is organized along sectoral lines, the sectoral network will need to be coordinated. The National Library of Nigeria has expressed the desire of assuming the task of this overall coordination and also the task of initiating the mission-oriented network. [11].

CONCLUSION

The paper has tried to review past and present disposition towards rational development of scientific and technical information systems in Nigeria, It shows that there is some awareness of the need for such systems, and that there are vast resources and considerable organizational support for its development. What is needed, then, is a set of policies to regulate and coordinate independent efforts in the use of information technology and conceptual design of the STI systems if they are to contribute optimally to national development. Of course, such policies must get political backing and financial support of the Federal Government of Nigeria to ensure appropriate tempo of development in the desired direction.

There are, of course, infrastructural problems which require decisive measures by the Federal Government. It is, however, encouraging to note that the Nigerian Telecommunication Limited (NITEL) is planning to provide a high speed data transmission service. It is also interesting to note that major computer installations are now able to minimize the destructive and disruptive effects of erratic power supply by installing the uninterrupted power supply unit (UPS).

Individual libraries have some fundamental tasks to undertake, including documentation and collection of information materials of research done in their parent organization and immediate environs, preparation of a proper inventory of their resources, maintenance of proper records of their stock, and effective preservation of materials. Library automation requires careful planning. It is suggested that libraries in specific sectors seek a common understanding and a unified approach.

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BOOK REVIEW

Users' Approach to Information in Libraries, by G Devarajan, New Delhi: Ess Ess Publications, 1989 xi, 89p. Rs. 100/- (Reviewed by Dr. Sewa Singh).

Information is considered to be a powerful resource and has become an important component in national development. Scholars, scientists, technologists, politicians, executives, managers, teachers, students, and public men all rub their shoulders with each other to gain current and adequate information so that they could excel in their respective areas of interest, But on the other hand, the amount of information has become enormous as a result of what is called 'information explosion'. In view of the increase in the number of users and consequently their diverse information needs, the problem of information analysis, processing, acquisition and dissemination are quite complex for the librarians and information scientists. Unless the user's information requirements are studied, it is difficult not only to assess the precise information needs but also to acquire, consolidate and market the information.

In the book under review are included four user studies aimed at four different user strata, viz., school students, scientists, humanities scholars, and development scientists. An attempt has been made to study the information needs, use pattern of information and behaviour of these four user groups.

The author has collected data through structured questionnaires, prepared separately for all the four categories of users. The first questionnaire consisting of 20 specific questions (in addition to 13 general) was circulated in senior secondary schools in Trivandrum, Kerala to study the reading interests of students. The 150 questionnairs (for this group of users) were analysed on the basis of different variables correlated with the socio-economic background of the respondents.

For the scientists, both the questionnaire and the interview methods were followed. The questionnaire regarding the user needs and use pattern was distributed to 75 scientists in the disciplines of physics, chemistry, biochemistry, botany, and zoology in the University of Kerala, Trivandrum. Out of these, 57 questionnaires were received back and analysed.

For the information needs and use pattern of literature by the scholars in humanities, the data was collected on similar basis. In all, 46 scholars in the field of literature, linguistics, and philosophy in the University of Kerala, Trivandrum responded to the survey on the basis of which the analysis is reported.

The fourth use study is confined to the reading interests and use habits of the development scientists working in the Centre for Deveelopment Studies, Trivandrum. The data were collected through a questionnaire distributed among 57 scientists, while only 31 responded. Some of them were interviewed also. The collected data were analysed on the basis of such variables as subjects, types of documents, popular journals, newspapers, etc.

The author gives the findings and possible suggestions in each chapter separately for each group. It is clear from these findings that the library resources are found to be inadequate by the scientists, development scientists, humanities scholars and the school students. The libraries should, therefore, make need-based acquisitions of the documentary sources and provision of information services including the user education programme.

Although all the four user studies are restricted geographically to Trivandrum only, the findings reported in this book are eye opener to the library profession at large. Further, the suggestions offered are quite valuable both for the librarians and the users. If some more similar studies are undertaken in other parts of the country, the findings are not expected to differ much.

The book under review, in addition to five chapters, also contains four appendices displaying the questionnaires prepared for conducting the studies and a helpful bibliography.

Though small in size, the book is well brought out by means of the DTP. There are some typographical errors. The quality of paper and binding is also good for which the publisher deserves appreciation. However, one-page Index is quite brief and inadequate.

Rural Development - An Annotated Bibliography of ILO Publications and Documents, (1983-90). Geneva, International Labour Office, 1990 (Reviewed by Mrs. J. K. Ahluwalia)

About 70% of population in the developing countries live and work in rural areas. The rural sector remains the backbone of economy in terms of its contribution to employment and people's livelihood in these countries, although the global macro development implies a progressive decline in the importance of the rural sector and its contribution towards the employment and livelihood for a majority of the population in many developing countries.

The incidence of rural poverty has remained virtually unchanged over the past two decades. Between 30 and 40% of the rural population live on incomes which are below the bare minimum required that to ensure a minimum calorie intake. Poverty results from underemployment and low returns to labour. Demand for the low export prices in the developing countries, the "debt crisis", and the realignment of exchange rates and prices lead to lowering of the returns to labour. The rural population also lack access to education, health facilities and other services.

These complex problems arising out of the present situation, require appropriate solutions. Innovative approaches are required to propose and implement necessary programmes, policies and methods that will not only generate economic growth but also make a fair distribution of its benefits. It is essential that the rural sector is given an increased prominence in macro development policies.

Considering all these factors, the bibliography running into 338 pages and giving the bibliographic references with abstracts to 757 documents issued on rural development trends, policies, strategies and allied fields by the ILO during 1983-90 is compiled by ILO in the series "International Labour Bibliography."

The bibliography consists of seven sections and three indexes, i.e. author, corporate author and subject. The first section covers the books that are published by the ILO itself. The second includes books of the ILO that are published by commercial publishers. The third section focuses on research and working papers prepared for the various technical programmes of the ILO. The conference papers and reports are included in section four. The articles published in ILO and other journals are covered in the fifth section, while reports of the technical co-operation projects are included in section six. Section seven groups other miscellaneous publications of the ILO.

The bibliography is a very convenient and useful tool for disseminating information on a wide range of topics concerning rural under employment, poverty, income distribution, labour markets, agrarian reforms, employment of rural women, etc.

It gives bibliographic description of the ILO publications reporting the programmes, policies and strategies to promote rural development and employment opportunities and alleviate rural poverty. Each entry in the bibliography comprises the name of the authority, title, publisher/citation of the periodical/name of the conference, programme, the language/s in which the document is available, the descriptors identifying the contents of the document and the references, tables, etc. appended with the document.

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